

ANALYTICAL REPORT

June 11, 2019

¹Cp

²Tc

³Ss

⁴Cn

⁵Tr

⁶Gl

⁷Al

⁸Sc

Cardno - Newark, DE

Sample Delivery Group: L1101422
Samples Received: 05/22/2019
Project Number:
Description: Deer Park 002

Report To: Art Saunders
121 Continental Drive Suite 308
Newark, DE 19713

Entire Report Reviewed By:



Craig Cothron
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace National is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



90016075

TABLE OF CONTENTS

ONE LAB. NATIONWIDE.



Cp: Cover Page	1	 ¹ Cp
Tc: Table of Contents	2	 ² Tc
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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



WW-20190520-002-DAY 18 L1101422-01 GW Collected by RN/VP Collected date/time 05/20/19 11:30 Received date/time 05/22/19 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Subcontracted Analyses	WG1285623	1	06/10/19 00:00	06/10/19 00:00	CBM	Minneapolis, MN 55414

WW-20190520-002-DAY 18 L1101422-02 GW Collected by RN/VP Collected date/time 05/20/19 11:30 Received date/time 05/22/19 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Subcontracted Analyses	WG1285625	1	06/10/19 00:00	06/10/19 00:00	CBM	Subcontract

¹Cp²Tc³Ss⁴Cn⁵Tr⁶Gl⁷Al⁸Sc



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Craig Cothron
Project Manager

- ¹ Cp
- ² Tc
- ³ Ss
- ⁴ Cn
- ⁵ Tr
- ⁶ Gl
- ⁷ Al
- ⁸ Sc

Project Narrative

L1101422 -01, -02 contains subout data that is included after the chain of custody.



This data package consists of this signature page, the laboratory review checklist, and the following reportable data as applicable:

R1 - Field chain-of-custody documentation;

R2 - Sample identification cross-reference;

R3 - Test reports (analytical data sheets) for each environmental sample that includes:

- a. Items consistent with NELAC Chapter 5,
- b. dilution factors,
- c. preparation methods,
- d. cleanup methods, and
- e. if required for the project, tentatively identified compounds (TICs).

R4 - Surrogate recovery data including:

- a. Calculated recovery (%R), and
- b. The laboratory's surrogate QC limits.

R5 - Test reports/summary forms for blank samples;

R6 - Test reports/summary forms for laboratory control samples (LCSs) including:

- a. LCS spiking amounts,
- b. Calculated %R for each analyte, and
- c. The laboratory's LCS QC limits.

R7 - Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

- a. Samples associated with the MS/MSD clearly identified,
- b. MS/MSD spiking amounts,
- c. Concentration of each MS/MSD analyte measured in the parent and spiked samples,
- d. Calculated %Rs and relative percent differences (RPDs), and
- e. The laboratory's MS/MSD QC limits

R8 - Laboratory analytical duplicate (if applicable) recovery and precision:

- a. The amount of analyte measured in the duplicate,
- b. The calculated RPD, and
- c. The laboratory's QC limits for analytical duplicates.

R9 - List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.

R10 - Other problems or anomalies.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Craig Cothron
Project Manager



Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

SDG	Sample Delivery Group.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
	The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

¹Cp²Tc³Ss⁴Cn⁵Tr⁶Gl⁷Al⁸Sc



Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

- * Not all certifications held by the laboratory are applicable to the results reported in the attached report.
- * Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660
Alaska	17-026
Arizona	AZ0612
Arkansas	88-0469
California	2932
Colorado	TN00003
Connecticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia ¹	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky ^{1,6}	90010
Kentucky ²	16
Louisiana	AI30792
Louisiana ¹	LA180010
Maine	TN0002
Maryland	324
Massachusetts	M-TN003
Michigan	9958
Minnesota	047-999-395
Mississippi	TN00003
Missouri	340
Montana	CERT0086

Nebraska	NE-OS-15-05
Nevada	TN-03-2002-34
New Hampshire	2975
New Jersey-NELAP	TN002
New Mexico ¹	n/a
New York	11742
North Carolina	Env375
North Carolina ¹	DW21704
North Carolina ³	41
North Dakota	R-140
Ohio-VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	LA000356
South Carolina	84004
South Dakota	n/a
Tennessee ^{1,4}	2006
Texas	T104704245-18-15
Texas ⁵	LAB0152
Utah	TN00003
Vermont	VT2006
Virginia	460132
Washington	C847
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

Third Party Federal Accreditations

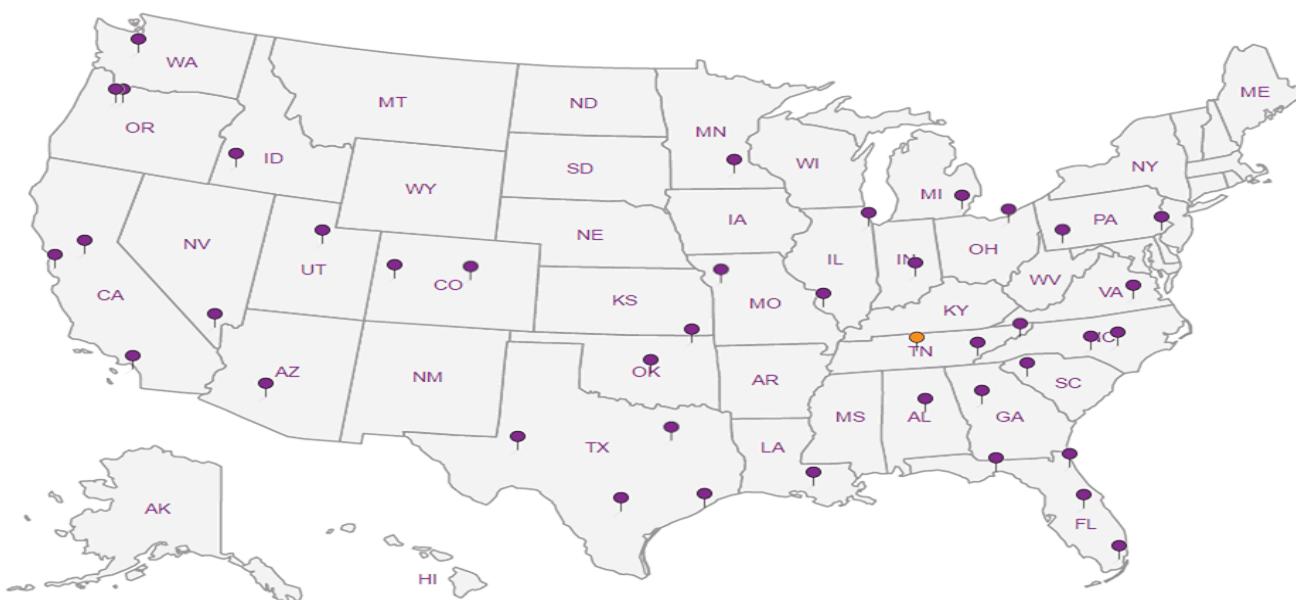
A2LA – ISO 17025	1461.01
A2LA – ISO 17025 ⁵	1461.02
Canada	1461.01
EPA-Crypto	TN00003

AIHA-LAP,LLC EMLAP	100789
DOD	1461.01
USDA	P330-15-00234

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ⁶ Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



- ¹ Cp
- ² Tc
- ³ Ss
- ⁴ Cn
- ⁵ Tr
- ⁶ Gl
- ⁷ Al
- ⁸ Sc

Cardno - Newark, DE

121 Continental Drive Suite 308
Newark, DE 19713

Billing Information:

Accounts Payable
121 Continental Drive Suite 308
Newark, DE 19713Pres
Chk

Analysis / Container / Preservative

Chain of Custody Page ____ of ____


 Pace Analytical®
National Center for Testing & Innovation
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859L# 1101422
E157

Tabl

Acctnum: CARDNONDE

Template: T149278

Prelogin: P704877

TSR: 034 - Craig Cothron

PB:

Shipped Via:

Remarks Sample # (lab only)

Report to:
Art SaundersProject
Description: Deer Park 002City/State
Collected:

Phone: 610-220-3957 Client Project #

Lab Project #
CARDNONDE-ITCFax:
Collected by (print): Valeria Nakamura, Ph.D.

Site/Facility ID #

P.O. #

Collected by (signature):
Richard Nakamura, Ph.D.

Rush? (Lab MUST Be Notified)

- Same Day Five Day
 Next Day 5 Day (Rad Only)
 Two Day 10 Day (Rad Only)
 Three Day

Quote #

Date Results Needed

No.
of
CntrsPacked on Ice N Y

Sample ID

Comp/Grab

Matrix *

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Date

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Report Prepared for:

Benita Miller
Pace Analytical National
12065 Lebanon Road
Mount Juliet TN 37122

**REPORT OF
LABORATORY
ANALYSIS
FOR PFAAs**

Report Prepared Date:

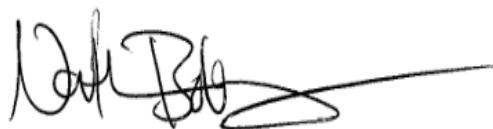
June 7, 2019

Report Information:

Pace Project #: 10476381
Sample Receipt Date: 05/24/2019
Client Project #: L1101422: WG1285623 PFA
Client Sub PO #: L1101422
State Cert #: 2926.01

Invoicing & Reporting Options:

This report has been reviewed by:



June 07, 2019

Nathan Boberg, Project Manager
612-360-0728
(612) 607-6444 (fax)
nathan.boberg@pacelabs.com



Report of Laboratory Analysis

This report should not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc.

The results relate only to the samples included in this report.

DISCUSSION

This report presents the results from the analyses performed on one sample submitted by a representative of Pace-National. The sample was analyzed for one perfluorinated compound using a modified version of USEPA Method 537. Reporting limits were set to the quantitation limits.

All isotopically-labeled standards related to the analytes of interest pass criteria. Matrix related failures of other standards, included by default, do not have an impact on this data.

A laboratory method blank was prepared and analyzed with the sample batch as part of our routine quality control procedures. The results show the blank was free of the target perfluorinated compounds at the reporting limits. This indicates that the sample processing procedures did not significantly contribute to the analyte content determined for the sample material.

Laboratory spike samples were also prepared with the sample batch using clean reference matrix that had been fortified with native standards. The recovery results were within the method limits. The RPDs (relative percent differences) between one designated spike and its duplicate were within the method limits. These spikes indicate that extraction performed as expected.

The recoveries of the isotopically-labeled surrogate standards in the sample extract was within the target ranges specified in the method.

It should be noted that Pace Analytical has not yet completed the certification process for all analytes in this method. Therefore, the results have been marked "N2" as qualified. Results for the low level spikes that were below the calibration range were flagged "J".



Minnesota Laboratory Certifications

Authority	Certificate #	Authority	Certificate #
A2LA	2926.01	Minnesota - Pet	1240
Alabama	40770	Mississippi	MN00064
Alaska - DW	MN00064	Missouri - DW	10100
Alaska - UST	17-009	Montana	CERT0092
Arizona	AZ0014	Nebraska	NE-OS-18-06
Arkansas - DW	MN00064	Nevada	MN00064
Arkansas - WW	88-0680	New Hampshire	2081
CNMI Saipan	MP0003	New Jersey (NE	MN002
California	2929	New York	11647
Colorado	MN00064	North Carolina	27700
Connecticut	PH-0256	North Carolina -	27700
EPA Region 8+	via MN 027-053	North Carolina -	530
Florida (NELAP	E87605	North Dakota	R-036
Georgia	959	Ohio - DW	41244
Guam	17-001r	Ohio - VAP	CL101
Hawaii	MN00064	Oklahoma	9507
Idaho	MN00064	Oregon - Primar	MN300001
Illinois	200011	Oregon - Secon	MN200001
Indiana	C-MN-01	Pennsylvania	68-00563
Iowa	368	Puerto Rico	MN00064
Kansas	E-10167	South Carolina	74003
Kentucky - DW	90062	South Dakota	NA
Kentucky - WW	90062	Tennessee	TN02818
Louisiana - DE	03086	Texas	T104704192
Louisiana - DW	MN00064	Utah (NELAP)	MN00064
Maine	MN00064	Virginia	460163
Maryland	322	Washington	C486
Massachusetts	M-MN064	West Virginia -	382
Michigan	9909	West Virginia -	9952C
Minnesota	027-053-137	Wisconsin	999407970
Minnesota - De	via MN 027-053	Wyoming - UST	2926.01

REPORT OF LABORATORY ANALYSIS

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Reporting Flags

- A = Reporting Limit based on signal to noise
- B = Less than 10x higher than method blank level
- C = Result obtained from confirmation analysis
- D = Result obtained from analysis of diluted sample
- E = Exceeds calibration range
- I = Interference present
- J = Estimated value
- L = Suppressive interference, analyte may be biased low
- Nn = Value obtained from additional analysis
- P = PCDEInterference
- R = Recovery outside target range
- S = Peak saturated
- U = Analyte not detected
- V = Result verified by confirmation analysis
- X = %D Exceeds limits
- Y = Calculated using average of daily RFs
- * = SeeDiscussion

REPORT OF LABORATORY ANALYSIS

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Appendix A

Sample Management



Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Sample ID Cross Reference

<u>Client Sample ID</u>	<u>Pace Sample ID</u>	<u>Date Received</u>	<u>Sample Type</u>
WW-20190520-002-DAY 18	10476381001	05/24/2019	Water
WW-20190520-002-DAY 18	10476381001-R	05/24/2019	Water

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
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NO# 10476381

CHAIN-OF-CUSTODY

The Chain-of-Custody is a LEGAL DOCUMENT.



Page : 1 Of 1

Report No:

Section A

Required Client Information:

Company: Pace Analytical National

Address: 12065 Lebanon Road

Mount Juliet, TN 37122

Email: SuboutTeam@pacenational.com

Phone: (615)773-9756 Fax: (615)758-5859

Requested Due Date: 6-Jun

Section B

Required Project Information:

Report To: Pace Analytical National Subout Team

Copy To:

Purchase Order #: L1101422

Project Name: Deer Park 002

Project #: n/a

Section C

Invoice Information:

Attention: Art Saunders

Company Name:

Address:

Pace Quote:

Pace Project Manager: Nathan Boberg

Pace Profile #: 38076

Regulatory Agency:

State / Location:

TX

#	SAMPLE ID One Character per box. (A-Z, 0-9 /, -) Sample Ids must be unique	MATRIX Drinking Water Water Waste Water Product Soil/Solid Oil Wipe Air Other Tissue	CODE DW WT WW P SL OL WP AR OT TS	MATRIX CODE (see valid codes to left) (G)=GRAB C=COMP	COLLECTED				SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives							Requested Analysis/Filtered (Y/N)										
					START		END				Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2SO3	Methanol	Other	DIOXIN/FURANS 1613	PFOA/methyl Sulfate	PCP	PCB	PCN	PCP	PCB	PCN		
					DATE	TIME	DATE	TIME																				
1	WW-20190520-002-DAY 18		WT				20-May	11:30		4	4								X	X								
2																												
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ADDITIONAL COMMENTS

RELINQUISHED BY / AFFILIATION

DATE

TIME

ACCEPTED BY / AFFILIATION

DATE

TIME

SAMPLE CONDITIONS

Benita Miller

23-May

12:53

Michael K. Pace

5/24/19

9:35

1.8

Y Y Y

Pace Analytical National Batch: WG1285623

Pace Analytical National SDG: L1101422

Location: Minneapolis, MN 55414

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER:

SIGNATURE of SAMPLER:

DATE Signed:

TEMP in C	Received on
	Ice (Y/N)
	Custody Sealed (Y/N)
	Cooler (Y/N)
	Samples Intact (Y/N)

	Document Name: Sample Condition Upon Receipt Form	Document Revised: 09May2019 Page 1 of 1
	Document No.: F-MN-L-213-rev.28	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt	Client Name: <i>Pace Analytical National</i>	Project #: <i>W0E10Y476301</i>																																																									
Courier:	<input checked="" type="checkbox"/> Fed Ex <input type="checkbox"/> UPS <input type="checkbox"/> USPS <input type="checkbox"/> Client <input type="checkbox"/> Pace <input type="checkbox"/> SpeeDee <input type="checkbox"/> Commercial See Exception	Date Received: <i>06/19/19</i>																																																									
Tracking Number:	<i>1023 1354 2710</i>																																																										
Custody Seal on Cooler/Box Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Seals Intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No																																																									
Packing Material:	<input checked="" type="checkbox"/> Bubble Wrap <input checked="" type="checkbox"/> Bubble Bags <input type="checkbox"/> None <input type="checkbox"/> Other: _____	Biological Tissue Frozen? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A																																																									
Thermometer:	<input type="checkbox"/> T1(0461) <input type="checkbox"/> T2(1336) <input type="checkbox"/> T3(0459) <input checked="" type="checkbox"/> T4(0254) <input type="checkbox"/> T5(0489)	Type of Ice: <input checked="" type="checkbox"/> Wet <input type="checkbox"/> Blue <input type="checkbox"/> None <input type="checkbox"/> Dry <input type="checkbox"/> Melted																																																									
Note: Each West Virginia Sample must have temp taken (no temp blanks)																																																											
Temp should be above freezing to 6°C	Cooler Temp Read w/temp blank: <i>1.8</i> °C	Average Corrected Temp <i>1.8</i> °C See Exceptions (no temp blank only): <input type="checkbox"/>																																																									
Correction Factor: <i>TME</i>	Cooler Temp Corrected w/temp blank: <i>1.8</i> °C																																																										
USDA Regulated Soil: (<input checked="" type="checkbox"/> N/A, water sample/Other: _____)		Date/Initials of Person Examining Contents: <i>MKZ S-24-19</i>																																																									
Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)? <input type="checkbox"/> Yes <input type="checkbox"/> No		Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? <input type="checkbox"/> Yes <input type="checkbox"/> No																																																									
If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.																																																											
<table border="1"> <thead> <tr> <th colspan="2"></th> <th>COMMENTS:</th> </tr> </thead> <tbody> <tr> <td>Chain of Custody Present and Filled Out?</td> <td><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</td> <td>1.</td> </tr> <tr> <td>Chain of Custody Relinquished?</td> <td><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</td> <td>2.</td> </tr> <tr> <td>Sampler Name and/or Signature on COC?</td> <td><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A</td> <td>3.</td> </tr> <tr> <td>Samples Arrived within Hold Time?</td> <td><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</td> <td>4.</td> </tr> <tr> <td>Short Hold Time Analysis (<72 hr)?</td> <td><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</td> <td>5. <input type="checkbox"/> Fecal Coliform <input type="checkbox"/> HPC <input type="checkbox"/> Total Coliform/E coli <input type="checkbox"/> BOD/cBOD <input type="checkbox"/> Hex Chrome <input type="checkbox"/> Turbidity <input type="checkbox"/> Nitrate <input type="checkbox"/> Nitrite <input type="checkbox"/> Orthophos <input type="checkbox"/> Other</td> </tr> <tr> <td>Rush Turn Around Time Requested?</td> <td><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</td> <td>6.</td> </tr> <tr> <td>Sufficient Volume?</td> <td><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</td> <td>7.</td> </tr> <tr> <td>Correct Containers Used? -Pace Containers Used?</td> <td><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</td> <td>8.</td> </tr> <tr> <td>Containers Intact?</td> <td><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</td> <td>9.</td> </tr> <tr> <td>Field Filtered Volume Received for Dissolved Tests?</td> <td><input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A</td> <td>10. 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Chain of Custody Relinquished?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	2.	Sampler Name and/or Signature on COC?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	3.	Samples Arrived within Hold Time?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	4.	Short Hold Time Analysis (<72 hr)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	5. <input type="checkbox"/> Fecal Coliform <input type="checkbox"/> HPC <input type="checkbox"/> Total Coliform/E coli <input type="checkbox"/> BOD/cBOD <input type="checkbox"/> Hex Chrome <input type="checkbox"/> Turbidity <input type="checkbox"/> Nitrate <input type="checkbox"/> Nitrite <input type="checkbox"/> Orthophos <input type="checkbox"/> Other	Rush Turn Around Time Requested?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	6.	Sufficient Volume?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	7.	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CLIENT NOTIFICATION/RESOLUTION
 Person Contacted: _____ Date/Time: _____
 Comments/Resolution: _____

Project Manager Review: *Lathan Barber* Date: *5/24/19*
 Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers).

Labeled by: *M7* Page 8 of 29

QC Matric lot #: 187814
Time of Spiking: 05/29/19 09:42
SPE Cartridge: 003837354A
Balance: 10BALQ

TRIZMA Lot #: 183004/18F285
Optima H2O Lot #: 187814
Methanol Lot #: 187805

Extract Start: 05/29/19 09:56
Extract End: 05/29/19 11:30
Setup By: QL/PY

	Lot Number	Amount	Initials	Expiration	Dispenser	Witness
Internal	12332-190	100	NH	11/22/19	Q503	wm
Surrogate	12332-187	100	PY	11/10/19	Q503	QL
Native Lo	12332-167	10	PY	10/19/19	Q503	QL
Native Mid						
Native Hi	12332-167	200	PY	10/19/19	Q503	QL
GenX IS	12332-175	200	PY	10/25/19	Q503	QL

#	Sample ID	GenX IS	Surrogate	Natives	Full Bottle Weight	Empty Bottle Weight	Amount Extracted	Comments
1	BLANK-70814	X	X		292.1	37.1	255.0	
2	LCS-70815	X	X	X	272.9	36.6	236.3	
3	LCS-70816	X	X	X	287.5	36.6	250.9	
4	LCSD-70817	X	X	X	277.2	36.6	240.6	
5	10476234001	X	X		283.6	37.0	246.6	
6	10476381001	X	X		285.9	37.7	248.2	
7	10476382001	X	X		281.2	37.4	243.7	
8	10475739001	X	X		290.2	34.9	255.2	
9	10476404001	X	X		286.5	37.6	248.9	
10	10476404002	X	X		280.9	38.7	242.1	
11	10476404003	X	X		274.5	36.5	238.0	
12	10476406001	X	X		276.6	38.6	237.9	
13	10476406002	X	X		287.2	38.3	248.9	
14	10476406003	X	X		283.1	38.0	245.1	
15	10476406004	X	X		282.3	37.7	244.6	
16	10476406005	X	X		273.8	38.4	235.4	
17	10476406006	X	X		281.8	37.4	244.5	
18	10476406007	X	X		280.8	37.0	243.8	
19	10476406008	X	X		279.7	38.3	241.4	
20	10476540001	X	X		280.5	37.0	243.5	
21	10476382001-DUP	X	X		282.5	37.5	245.0	



EB-24690

Appendix B

Sample Analysis Summary



Pace Analytical Services, LLC

1700 Elm Street, Suite 200

Minneapolis, MN 55414

(612) 607-1700

Method 537 (Modified)

Sample Analysis Summary

Client's Sample ID	WW-20190520-002-DAY 18	Date Extracted	05/29/2019
Lab Sample ID	10476381001	Total Amount Extracted	248 mL
Filename	B190603B_005	ICAL ID	190603A02
Matrix	Water	Starting CCal	B190603B_004
Collected	05/20/2019	Ending CCal	B190603B_010
Received	05/24/2019	Method Blank Filename	B190530B_014

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFOS	ND	1.9	0.63	1	06/04/2019 08:21	1763-23-1	N2

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.6	81	70 - 130	Pass
13C2_PFDA	2.0	2.0	101	70 - 130	Pass
d5-EtFOSAA	8.0	6.6	82	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPOPrA	328535	215569 - 646707	261440 - 522881	Pass
13C2_PFOA	494005	255932 - 767795	362838 - 725676	Pass
13C4_PFOS	827887	445609 - 1336826	618997 - 1237994	Pass
d3-MeFOSAA	485387	259839 - 779517	361219 - 722438	Pass

50-150% of Ical area

70-140% of the preceding CCV area

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.

Appendix C

QC and Calibration Results Summary



Pace Analytical Services, LLC

1700 Elm Street, Suite 200

Minneapolis, MN 55414

(612) 607-1700

Method 537 (Modified) Blank Analysis Summary

Lab Sample ID	BLANK-70814	Total Amount Extracted	255 mL
Filename	B190530B_014	ICAL ID	190530A02
Matrix	Water	Starting CCal	B190530B_004
Date Extracted	05/29/2019	Ending CCal	B190530B_017

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFOS	ND	0	0.61	1	05/30/2019 16:30	1763-23-1	N2

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.7	86	70 - 130	Pass
13C2_PFDA	2.0	1.9	93	70 - 130	Pass
d5-EtFOSAA	8.0	3.9	49	70 - 130	Fail

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrOPrA	219793	134260 - 402781	172867 - 345733	Pass
13C2_PFOA	475710	225330 - 675989	303311 - 606622	Pass
13C4_PFOS	593787	301397 - 904191	421516 - 843031	Pass
d3-MeFOSAA	357827	182697 - 548090	244139 - 488277	Pass

50-150% of Ical area

70-140% of the preceding CCV area

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.



Pace Analytical Services, LLC

1700 Elm Street, Suite 200

Minneapolis, MN 55414

(612) 607-1700

Method 537 (Modified) Laboratory Control Sample (LCS)

LCS Lab Sample ID	LCS-70815	Matrix	Water
LCS Filename	B190530B_015	Dilution	1
Total Amount Extracted	236mL	Extracted	05/29/2019
ICAL ID	190530A02	Analyzed	05/30/2019 16:41
Start CCAL Filename	B190530B_004	Injected By	WM
End CCAL Filename	B190530B_017		
Method Blank Filename	B190530B_014		

Compound	Spiked (ng/L)	Recovered (ng/L)	Recovery %	Limits
PFOS	2.0	2.3	112	50.0 - 150.0

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.8	92	70 - 130	Pass
13C2_PFDA	2.0	1.9	96	70 - 130	Pass
d5-EtFOSAA	8.0	4.1	52	70 - 130	Fail

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrOPrA	351472	175772 - 527315	210973 - 421945	Pass
13C2_PFOA	513219	241388 - 724164	351713 - 703427	Pass
13C4_PFOS	872215	370672 - 1112015	514556 - 1029112	Pass
d3-MeFOSAA	916735	330534 - 991601	477642 - 955284	Pass

50-150% of Ical area

70-140% of the preceding CCV area



Pace Analytical Services, LLC

1700 Elm Street, Suite 200

Minneapolis, MN 55414

(612) 607-1700

Method 537 (Modified) Laboratory Control Sample (LCS)

LCS Lab Sample ID	LCS-70816	Matrix	Water
LCS Filename	B190530B_019	Dilution	1
Total Amount Extracted	251mL	Extracted	05/29/2019
ICAL ID	190530A02	Analyzed	05/30/2019 17:28
Start CCal Filename	B190530B_017	Injected By	WM
End CCal Filename	B190530B_026		
Method Blank Filename	B190530B_014		

Compound	Spiked (ng/L)	Recovered (ng/L)	Recovery %	Limits
PFOS	38	39	102	70.0 - 130.0

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	94	70 - 130	Pass
13C2_PFDA	2.0	2.1	105	70 - 130	Pass
d5-EtFOSAA	8.0	4.9	61	70 - 130	Fail

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrOPrA	213660	134260 - 402781	156765 - 313529	Pass
13C2_PFOA	460016	225330 - 675989	313232 - 626465	Pass
13C4_PFOS	613807	301397 - 904191	418594 - 837187	Pass
d3-MeFOSAA	354376	182697 - 548090	249789 - 499579	Pass

50-150% of Ical area

70-140% of the preceding CCV area



Pace Analytical Services, LLC

1700 Elm Street, Suite 200

Minneapolis, MN 55414

(612) 607-1700

Method 537 (Modified) Laboratory Control Sample Duplicate (LCSD)

LCSD Lab Sample ID	LCSD-70817	LCS Filename	B190530B_019
LCSD Filename	B190530B_020	Matrix	Water
Total Amount Extracted	241mL	Dilution	1
ICAL ID	190530A02	Extracted	05/29/2019
Start CCal Filename	B190530B_017	Analyzed	05/30/2019 17:40
End CCal Filename	B190530B_026	Injected By	WM
Method Blank Filename	B190530B_014		

Compound	Spiked (ng/L)	Recovered (ng/L)	Recovery %	Recovery Limits	RPD %
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PFOS	40	42	105	70.0 - 130.0	7
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Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.8	90	70 - 130	Pass
13C2_PFDA	2.0	2.2	108	70 - 130	Pass
d5-EtFOSAA	8.0	5.0	62	70 - 130	Fail

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrOPrA	194419	134260 - 402781	156765 - 313529	Pass
13C2_PFOA	447404	225330 - 675989	313232 - 626465	Pass
13C4_PFOS	591597	301397 - 904191	418594 - 837187	Pass
d3-MeFOSAA	336382	182697 - 548090	249789 - 499579	Pass

50-150% of Ical area

70-140% of the preceding CCV area

**PFAA Initial Calibration Response Factor Summary**

ICAL ID	190530A02	Data Files:	CS-1	B190530A_002	11:23
Calibration Date	05/30/2019		CS-2	B190530A_003	11:35
Instrument	10LCMS02		CS-3	B190530A_004	11:46
Column Phase	C18		CS-4	B190530A_005	11:58
Column ID No.	H18-061776		CS-5	B190530A_006	12:10
Analyst	NH		CS-6	B190530A_007	12:22

Response Factors

Compound	Type	CAL1	CAL2	CAL3	CAL4	CAL5	CAL6	Slope	R ²
13C3_PFPrOPrA	L	17300	16100	16400	17800	16800	16200	16800	0.999
13C2_PFOA	L	223000	224000	222000	229000	226000	228000	225000	1.000
13C4_PFOS	L	107000	104000	102000	106000	105000	106000	105000	1.000
d3-MeFOSAA	L	45800	45500	45200	45200	46900	45400	45700	1.000
13C2_PFHxA	L	1.14	1.10	1.12	1.08	1.09	1.07	1.10	1.000
13C2_PFDA	L	5.55	5.40	5.51	5.52	5.43	5.46	5.48	1.000
d5-EtFOSAA	L	0.865	0.801	0.833	0.814	0.785	0.756	0.809	0.998
PFBA	L	0.950	0.800	0.967	0.829	0.809	0.786	0.794	0.999
PFPeA	L	1.00	0.958	0.968	0.955	0.972	0.931	0.941	1.000
PFBS	L	0.481	0.447	0.471	0.470	0.470	0.454	0.458	1.000
PFHxA	L	1.10	1.01	1.07	1.01	1.01	0.966	0.978	0.999
PFPrOPrA	L	1.48	1.35	1.29	1.20	1.14	1.20	1.19	1.000
PFHpA	L	1.07	1.02	1.07	1.09	1.05	1.01	1.02	1.000
NaDONA	L	14.8	15.4	15.9	14.5	15.0	14.6	14.7	1.000
PFHxS	L	0.379	0.365	0.367	0.372	0.369	0.349	0.354	0.999
PFOA	L	1.02	0.942	0.980	0.964	0.992	0.919	0.936	0.999
PFNA	L	1.92	1.91	1.98	1.94	1.91	1.79	1.82	0.999
PFOS	L	1.02	1.01	1.01	0.996	1.03	0.989	0.997	1.000
PFDA	L	4.59	4.68	4.63	4.75	4.42	4.60	4.57	1.000
PFUdA	L	7.85	7.20	7.41	7.58	7.08	6.78	6.88	0.999
N-MeFOSAA	L	1.10	1.02	1.10	1.07	1.03	1.04	1.04	1.000
N-EtFOSAA	L	1.26	1.21	1.21	1.18	1.12	1.14	1.14	1.000
PFDS	L	2.57	2.42	2.56	2.64	2.56	2.56	2.56	1.000
PFDoA	L	5.08	5.04	5.08	5.08	4.92	4.92	4.93	1.000
PFTrDA	L	5.10	4.83	5.07	5.27	5.04	5.01	5.03	1.000
PFTeDA	L	1.93	1.80	1.91	1.93	1.87	1.91	1.91	1.000
PFHxDA	L	3.20	2.96	3.13	3.12	3.02	3.03	3.04	1.000
PFODA	L	1.48	1.48	1.57	1.56	1.56	1.54	1.54	1.000

Slope: Linear calibration

**PFAA Initial Calibration Recovery Summary**

ICAL ID	190530A02	Data Files:	CS-1	B190530A_002	11:23
Calibration Date	05/30/2019		CS-2	B190530A_003	11:35
Instrument	10LCMS02		CS-3	B190530A_004	11:46
Column Phase	C18		CS-4	B190530A_005	11:58
Column ID No.	H18-061776		CS-5	B190530A_006	12:10
Analyst	NH		CS-6	B190530A_007	12:22

%Recoveries

Compound	CAL1	CAL2	CAL3	CAL4	CAL5	CAL6
13C3_PFPPrOPrA	103	96	98	106	100	97
13C2_PFOA	99	99	98	101	100	101
13C4_PFOS	102	99	97	101	100	101
d3-MeFOSAA	100	100	99	99	103	99
13C2_PFHxA	104	100	101	98	99	97
13C2_PFDA	101	99	101	101	99	100
d5-EtFOSAA	107	99	103	101	97	93
PFBA	120	101	122	104	102	99
PFPeA	107	102	103	101	103	99
PFBS	105	98	103	103	103	99
PFHxA	113	104	109	103	104	99
PFPrOPrA	125	113	108	101	96	101
PFHpA	105	100	105	106	103	99
NaDONA	101	105	108	99	102	99
PFHxS	107	103	104	105	104	99
PFOA	109	101	105	103	106	98
PFNA	106	105	109	106	105	98
PFOS	102	101	101	100	103	99
PFDA	100	102	101	104	97	101
PFUdA	114	105	108	110	103	99
N-MeFOSAA	106	98	106	103	100	100
N-EtFOSAA	110	106	106	104	99	100
PFDS	100	94	100	103	100	100
PFDoA	103	102	103	103	100	100
PFTrDA	101	96	101	105	100	100
PFTeDA	101	94	100	101	98	100
PFHxDA	105	98	103	103	99	100
PFODA	96	96	102	101	101	100



Pace Analytical Services, LLC

1700 Elm Street, Suite 200

Minneapolis, MN 55414

(612) 607-1700

Method 537 (Modified) Calibration Verification Summary ICV

Lab Calibration ID ICV-12332-189
Run File Name B190530A_009
Injected By WM
Analyzed 05/30/2019 12:45
Instrument ID 10LCMS02
Column ID H18-061776
Ical ID 190530A02

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	19	18	97	70.0-130.0	514353

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.0	99	70 - 130	Pass
13C2_PFDA	2.0	2.0	101	70 - 130	Pass
d5-EtFOSAA	8.0	7.9	98	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPnOPrA	246301	134260 - 402781	---	Pass
13C2_PFOA	461282	225330 - 675989	---	Pass
13C4_PFOS	640989	301397 - 904191	---	Pass
d3-MeFOSAA	365097	182697 - 548090	---	Pass

50-150% of Ical area

70-140% of the preceding CCV area

**PFAA Initial Calibration Response Factor Summary**

ICAL ID	190603A02	Data Files:	CS-1	B190603A_004	20:40
Calibration Date	06/03/2019		CS-2	B190603A_005	20:52
Instrument	10LCMS02		CS-3	B190603A_006	21:04
Column Phase	C18		CS-4	B190603A_007	21:15
Column ID No.	H18-061776		CS-5	B190603A_008	21:27
Analyst	NH		CS-6	B190603A_009	21:39

Response Factors

Compound	Type	CAL1	CAL2	CAL3	CAL4	CAL5	CAL6	Slope	R ²
13C3_PFPrOPrA	L	29600	25000	28100	28100	27000	23800	26900	0.995
13C2_PFOA	L	259000	252000	246000	249000	274000	255000	256000	0.999
13C4_PFOS	L	157000	154000	157000	158000	159000	147000	155000	0.999
d3-MeFOSAA	L	63800	64000	60900	63800	69400	67800	65000	0.998
13C2_PFHxA	L	1.18	1.20	1.25	1.23	1.21	1.17	1.21	0.999
13C2_PFDA	L	4.84	4.40	5.02	4.66	4.70	4.03	4.61	0.995
d5-EtFOSAA	L	0.850	0.748	0.807	0.771	0.763	0.694	0.772	0.996
PFBA	L	0.899	0.734	0.815	0.763	0.725	0.717	0.722	1.000
PFPeA	L	1.00	0.963	1.02	1.01	0.932	0.911	0.921	0.999
PFBS	L	0.613	0.597	0.633	0.636	0.597	0.579	0.586	0.999
PFHxA	L	1.21	1.11	1.17	1.18	1.04	0.975	1.00	0.997
PFPrOPrA	L	1.34	1.34	1.21	1.17	1.25	1.25	1.25	1.000
PFHpA	L	1.23	1.17	1.17	1.20	1.12	1.05	1.07	0.998
NaDONA	L	11.9	13.5	12.0	11.8	11.7	11.4	11.5	1.000
PFHxS	L	0.444	0.416	0.435	0.447	0.428	0.417	0.420	1.000
PFOA	L	1.02	1.01	1.07	1.04	0.962	0.931	0.943	0.999
PFNA	L	1.57	1.45	1.44	1.47	1.52	1.44	1.46	1.000
PFOS	L	0.921	0.884	0.910	0.935	0.920	0.890	0.898	1.000
PFDA	L	3.51	3.17	3.91	3.54	3.34	3.05	3.13	0.997
PFUdA	L	5.42	5.19	5.74	5.28	4.86	4.25	4.43	0.994
N-MeFOSAA	L	0.990	0.910	0.994	0.919	0.902	0.896	0.899	1.000
N-EtFOSAA	L	1.04	0.941	1.06	0.973	0.925	0.880	0.895	0.999
PFDS	L	2.89	2.83	2.97	2.62	2.50	2.46	2.48	0.999
PFDoA	L	4.28	3.95	4.33	3.95	3.95	3.46	3.59	0.996
PFTrDA	L	3.74	3.65	3.99	3.91	3.50	3.36	3.42	0.998
PFTeDA	L	2.22	1.86	1.93	1.87	1.77	1.68	1.71	0.999
PFHxDA	L	3.36	2.84	3.21	3.07	3.17	3.03	3.06	1.000
PFODA	L	2.56	2.34	2.54	2.42	2.45	2.39	2.40	1.000

Slope: Linear calibration

**PFAA Initial Calibration Recovery Summary**

ICAL ID	190603A02	Data Files:	CS-1	B190603A_004	20:40
Calibration Date	06/03/2019		CS-2	B190603A_005	20:52
Instrument	10LCMS02		CS-3	B190603A_006	21:04
Column Phase	C18		CS-4	B190603A_007	21:15
Column ID No.	H18-061776		CS-5	B190603A_008	21:27
Analyst	NH		CS-6	B190603A_009	21:39

%Recoveries

Compound	CAL1	CAL2	CAL3	CAL4	CAL5	CAL6
13C3_PFPPrOPrA	110	93	104	104	100	88
13C2_PFOA	101	98	96	97	107	100
13C4_PFOS	101	99	101	102	102	95
d3-MeFOSAA	98	99	94	98	107	104
13C2_PFHxA	98	99	104	102	100	97
13C2_PFDA	105	95	109	101	102	88
d5-EtFOSAA	110	97	104	100	99	90
PFBA	125	102	113	106	100	99
PFPeA	109	105	110	110	101	99
PFBS	105	102	108	109	102	99
PFHxA	121	111	117	118	104	98
PFPrOPrA	108	108	97	93	100	100
PFHpA	115	109	109	113	105	98
NaDONA	104	118	105	103	102	99
PFHxS	106	99	104	106	102	99
PFOA	108	107	114	110	102	99
PFNA	108	100	99	101	104	99
PFOS	103	98	101	104	103	99
PFDA	112	101	125	113	107	97
PFUdA	122	117	130	119	110	96
N-MeFOSAA	110	101	111	102	100	100
N-EtFOSAA	116	105	118	109	103	98
PFDS	117	114	120	106	101	99
PFDoA	119	110	121	110	110	96
PFTrDA	109	107	117	114	102	98
PFTeDA	130	109	113	109	103	98
PFHxDA	110	93	105	100	104	99
PFODA	106	97	106	101	102	99



Pace Analytical Services, LLC

1700 Elm Street, Suite 200

Minneapolis, MN 55414

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Method 537 (Modified) Calibration Verification Summary ICV

Lab Calibration ID	ICV-12332-189	Instrument ID	10LCMS02
Run File Name	B190603A_010	Column ID	H18-061776
Injected By	WM	Ical ID	190603A02
Analyzed	06/03/2019 21:50		

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	19	18	93	70.0-130.0	642635

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.0	99	70 - 130	Pass
13C2_PFDA	2.0	1.9	95	70 - 130	Pass
d5-EtFOSAA	8.0	7.8	98	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPrA	467658	215569 - 646707	---	Pass
13C2_PFOA	523267	255932 - 767795	---	Pass
13C4_PFOS	922174	445609 - 1336826	---	Pass
d3-MeFOSAA	547450	259839 - 779517	---	Pass

50-150% of Ical area

70-140% of the preceding CCV area



Pace Analytical Services, LLC

1700 Elm Street, Suite 200

Minneapolis, MN 55414

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Method 537 (Modified) Calibration Verification Summary ICV

Lab Calibration ID ICV-12332-189
Run File Name B190530A_009
Injected By WM
Analyzed 05/30/2019 12:45
Instrument ID 10LCMS02
Column ID H18-061776
Ical ID 190530A02

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	19	18	97	70.0-130.0	514353

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.0	99	70 - 130	Pass
13C2_PFDA	2.0	2.0	101	70 - 130	Pass
d5-EtFOSAA	8.0	7.9	98	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPnOPrA	246301	134260 - 402781	---	Pass
13C2_PFOA	461282	225330 - 675989	---	Pass
13C4_PFOS	640989	301397 - 904191	---	Pass
d3-MeFOSAA	365097	182697 - 548090	---	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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Minneapolis, MN 55414

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Method 537 (Modified) Calibration Verification Summary ICV

Lab Calibration ID	ICV-12332-189	Instrument ID	10LCMS02
Run File Name	B190603A_010	Column ID	H18-061776
Injected By	WM	Ical ID	190603A02
Analyzed	06/03/2019 21:50		

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	19	18	93	70.0-130.0	642635

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.0	99	70 - 130	Pass
13C2_PFDA	2.0	1.9	95	70 - 130	Pass
d5-EtFOSAA	8.0	7.8	98	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPrA	467658	215569 - 646707	---	Pass
13C2_PFOA	523267	255932 - 767795	---	Pass
13C4_PFOS	922174	445609 - 1336826	---	Pass
d3-MeFOSAA	547450	259839 - 779517	---	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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**Method 537 (Modified) Calibration Verification Summary
CCV**

Lab Calibration ID	CAL-12332-188-01	Instrument ID	10LCMS02
Run File Name	B190530B_004	Column ID	H18-061776
Injected By	WM	Ical ID	190530A02
Analyzed	05/30/2019 14:32	Level	Low

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	1.9	1.9	101	50.0-150.0	50733

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.0	102	70 - 130	Pass
13C2_PFDA	2.0	2.0	100	70 - 130	Pass
d5-EtFOSAA	8.0	8.2	102	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrOPrA	246952	134260 - 402781	---	Pass
13C2_PFOA	433302	225330 - 675989	---	Pass
13C4_PFOS	602165	301397 - 904191	---	Pass
d3-MeFOSAA	348769	182697 - 548090	---	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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**Method 537 (Modified) Calibration Verification Summary
CCV**

Lab Calibration ID	CAL-12332-188-03	Instrument ID	10LCMS02
Run File Name	B190530B_017	Column ID	H18-061776
Injected By	WM	Ical ID	190530A02
Analyzed	05/30/2019 17:05	Level	Mid

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	9.6	9.7	101	70.0-130.0	251578

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	95	70 - 130	Pass
13C2_PFDA	2.0	2.1	103	70 - 130	Pass
d5-EtFOSAA	8.0	8.4	105	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPnOPrA	223949	134260 - 402781	172867 - 345733	Pass
13C2_PFOA	447475	225330 - 675989	303311 - 606622	Pass
13C4_PFOS	597991	301397 - 904191	421516 - 843031	Pass
d3-MeFOSAA	356842	182697 - 548090	244139 - 488277	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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**Method 537 (Modified) Calibration Verification Summary
CCV**

Lab Calibration ID	CAL-12332-188-05	Instrument ID	10LCMS02
Run File Name	B190530B_026	Column ID	H18-061776
Injected By	WM	Ical ID	190530A02
Analyzed	05/30/2019 18:51	Level	High

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	38	38	100	70.0-130.0	1037736

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	93	70 - 130	Pass
13C2_PFDA	2.0	2.1	104	70 - 130	Pass
d5-EtFOSAA	8.0	8.1	101	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPrA	233384	134260 - 402781	156765 - 313529	Pass
13C2_PFOA	455174	225330 - 675989	313232 - 626465	Pass
13C4_PFOS	622961	301397 - 904191	418594 - 837187	Pass
d3-MeFOSAA	364186	182697 - 548090	249789 - 499579	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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**Method 537 (Modified) Calibration Verification Summary
CCV**

Lab Calibration ID	CAL-12332-188-01	Instrument ID	10LCMS02
Run File Name	B190603B_004	Column ID	H18-061776
Injected By	WM	Ical ID	190603A02
Analyzed	06/04/2019 08:09	Level	Low

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	1.9	2.0	106	50.0-150.0	70667

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.0	100	70 - 130	Pass
13C2_PFDA	2.0	2.2	109	70 - 130	Pass
d5-EtFOSAA	8.0	8.7	109	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPrA	373486	215569 - 646707	---	Pass
13C2_PFOA	518340	255932 - 767795	---	Pass
13C4_PFOS	884281	445609 - 1336826	---	Pass
d3-MeFOSAA	516027	259839 - 779517	---	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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**Method 537 (Modified) Calibration Verification Summary
CCV**

Lab Calibration ID	CAL-12332-188-03	Instrument ID	10LCMS02
Run File Name	B190603B_010	Column ID	H18-061776
Injected By	WM	Ical ID	190603A02
Analyzed	06/04/2019 09:19	Level	Mid

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	9.6	10	106	70.0-130.0	327702

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	96	70 - 130	Pass
13C2_PFDA	2.0	2.0	102	70 - 130	Pass
d5-EtFOSAA	8.0	8.8	110	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPrA	345249	215569 - 646707	261440 - 522881	Pass
13C2_PFOA	488372	255932 - 767795	362838 - 725676	Pass
13C4_PFOS	828636	445609 - 1336826	618997 - 1237994	Pass
d3-MeFOSAA	505604	259839 - 779517	361219 - 722438	Pass

50-150% of Ical area

70-140% of the preceding CCV area



Ana-Lab Corp.
P.O. Box 9000
Kilgore, TX 75663
903/984-0551

LELAP-accredited #02008

Report

Table of Contents

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Pace Analytical/TN
12065 Lebanon Rd
Mt Juliet, TN 37122

Account

PAJL-A

Project

875403

This report consists of this Table of Contents and the following pages:

<u>Report Name</u>	<u>Description</u>	<u>Pages</u>
875403_r03_03_ProjectResults	Ana-Lab Project P:875403 C:PAJL Project Results t:304	2
875403_r10_05_ProjectQC	Ana-Lab Project P:875403 C:PAJL Project Quality Control Groups	1
875403_r99_09_CoC_1_of_1	Ana-Lab CoC PAJL 875403_1_of_1	2
Total Pages:		5



Corporate Shipping: 2600 Dudley Rd. Kilgore, TX 75662



NELAP-accredited #T104704201-19-15



Results

Printed: 06/04/2019 9:32

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Report To

Pace Analytical/TN
12065 Lebanon Rd
Mt Juliet, TN 37122

Account

PAJL-A

Results

1786522 WW-20190520-002-DAY 18

Received: 05/24/2019

Non-Potable Water

Collected by: Client

Pace Analytical/TN

PO:

Taken: 05/20/2019 11:30:00

EPA 245.7 2

Prepared: 840604 05/30/2019 06:22:09 Analyzed 840829 05/30/2019 12:30:00 LPS

Parameter

Results

Units

RL

Flag

CAS

Bottle

N Mercury, Total (low level)

<4.26

ng/L

4.26

7439-97-6

02

Sample Preparation

1786522 WW-20190520-002-DAY 18

Received: 05/24/2019

Cooler Return

Prepared: 06/03/2019 17:00:00 Analyzed 06/03/2019 17:00:00 MG3

z Return Cooler/No bottles Require

Returned

EPA 245.7 2

Prepared: 840604 05/30/2019 06:22:09 Analyzed 840604 05/30/2019 06:22:09 LPS

N Low Level Mercury Liquid Metals

50/47

ml

01

Corporate Shipping: 2600 Dudley Rd. Kilgore, TX 75662

Corporate: 2600 Dudley Road Kilgore TX 75662





Results

Printed: 06/04/2019 9:32

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875403

Qualifiers:

We report results on an As Received or wet basis unless marked Dry Weight. Unless otherwise noted, testing was performed at Ana-labs corporate laboratory that holds the following Federal and State certificates: EPA Lab Number TX00063, US Department of Agriculture Soil Import Permit P330-17-00117, Texas Commission on Environmental Quality Commercial Drinking Water Lab Approval (Lab ID: TX219), Texas Commission on Environmental Quality NELAP T104704201-19-15, Louisiana Department of Environmental Quality Laboratory Certification (NELAP, LELAP) #02008, Louisiana Department of Health and Hospitals Drinking Water (NELAP) Certificate No LA026, Oklahoma Department of Environmental Quality TNI Laboratory Accreditation Program Certificate No. 2018-126, Arkansas Department of Environmental Quality Certification #18-068-0. The Accredited column designates accreditation by N -- NELAC, or z -- not covered under NELAC scope of accreditation.

These analytical results relate to the sample tested. This report may NOT be reproduced EXCEPT in FULL without written approval of Ana-Lab Corp. Unless otherwise specified, these test results meet the requirements of NELAC.

RL is the Reporting Limit (sample specific quantitation limit) and is at or above the Method Detection Limit (MDL). CAS is Chemical Abstract Service number. RL is our Reporting Limit, or Minimum Quantitation Level. The RL takes into account the Instrument Detection Limit (IDL), Method Detection Limit (MDL), and Practical Quantitation Limit (PQL), and any dilutions and/or concentrations performed during sample preparation (EQL). Our analytical result must be above this RL before we report a value in the 'Results' column of our report (without a 'J' flag). Otherwise, we report ND (Not Detected above RL), because the result is "<" (less than) the number in the RL column. MAL is Minimum Analytical Level and is typically from regulatory agencies. Unless we report a result in the result column, or interferences prevent it, we work to have our RL at or below the MAL.

Bill Peery, MS, VP Technical Services



Corporate Shipping: 2600 Dudley Rd. Kilgore, TX 75662

Corporate: 2600 Dudley Road Kilgore TX 75662





Quality Control

Printed 06/04/2019

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Report To

Pace Analytical/TN
12065 Lebanon Rd
Mt Juliet, TN 37122

Account

PAJL-A

Analytical Set **840829**

EPA 245.7 2

AWRL/MRL C

<u>Parameter</u>		<u>Reading</u>	<u>Known</u>	<u>Units</u>	<u>Recover%</u>	<u>Limits%</u>	<u>File</u>
Mercury, Total (low level)		5.00	5.00	ng/L	100	70.0 - 130	119981506
Blank							
<u>Parameter</u>	<u>PrepSet</u>	<u>Reading</u>	<u>MDL</u>	<u>MQL</u>	<u>Units</u>		<u>File</u>
Mercury, Total (low level)	840604	ND	0.573	4.00	ng/L		119981507
CCV							
<u>Parameter</u>		<u>Reading</u>	<u>Known</u>	<u>Units</u>	<u>Recover%</u>	<u>Limits%</u>	<u>File</u>
Mercury, Total (low level)		9.70	10.0	ng/L	97.0	76.0 - 124	119981505
		10.0	10.0	ng/L	100	76.0 - 124	119981517
		10.2	10.0	ng/L	102	76.0 - 124	119981528
		10.2	10.0	ng/L	102	76.0 - 124	119981536
		10.5	10.0	ng/L	105	76.0 - 124	119981538
ICL							
<u>Parameter</u>		<u>Reading</u>	<u>Known</u>	<u>Units</u>	<u>Recover%</u>	<u>Limits%</u>	<u>File</u>
Mercury, Total (low level)		97.1	100	ng/L	97.1	90.0 - 110	119981503
ICV							
<u>Parameter</u>		<u>Reading</u>	<u>Known</u>	<u>Units</u>	<u>Recover%</u>	<u>Limits%</u>	<u>File</u>
Mercury, Total (low level)		9.60	10.0	ng/L	96.0	90.0 - 110	119981504
LCS Dup							
<u>Parameter</u>	<u>PrepSet</u>	<u>LCS</u>	<u>LCSD</u>		<u>Known</u>	<u>Limits%</u>	<u>LCS%</u>
Mercury, Total (low level)	840604	23.0	23.6		25.0	76.0 - 113	92.0
							94.4
MSD							
<u>Parameter</u>	<u>Sample</u>	<u>MS</u>	<u>MSD</u>	<u>UNK</u>	<u>Known</u>	<u>Limits</u>	<u>MS%</u>
Mercury, Total (low level)	1785552	22.9	22.0	1.70	26.6	67.0 - 111	79.7
	1786306	18.3	18.7	ND	26.6	67.0 - 111	68.8
							76.3
							70.3
							ng/L 4.34 18.0
							ng/L 2.16 18.0

* Out RPD is Relative Percent Difference: $\text{abs}(r1-r2) / \text{mean}(r1,r2) * 100\%$

Recover% is Recovery Percent: result / known * 100%

Blank - Method Blank; CCV - Continuing Calibration Verification; ICV - Initial Calibration Verification; AWRL/MRL C - Ambient Water Reporting Limit/Minimum Reporting Limit Check Std



1 of 2

875403 CoC Print Group 001 of 001

Sub-Contract Chain of Custody						
Batch Date/Time: 05/23/19 12:37 Sub-Contract Lab: ANALABK.TX Address: 2600 Dudley Rd City/State: Kilgore, TX 75662-3730 Contact: tanya.chiwood@ann-lab.com			WO: WG1285625 Results Due Date: 06/06/19 ESC Purchase Order #: L1101422 Send Reports to: Brenda Miller Email: SuboutTeam@esciabsciences.com			 12065 Lebanon Rd. Mt. Juliet, TN 37122 call:(615)773-9756
Sample ID Container ID	Matrix	State	Collect Date	Description	Sample Number Lab Use Only	Sample Comments Lab Use Only
WW-20190520-002-DAY 18 28296423	GW	TX	05/20/19 11:30	MERCURY 245.7 QC3	2.L1101422-02	MERCURY 245.7 QC3
* Container used for multiple Samples and/or Analyses						
Relinquished by:	Bm		Date	05/23/19		
Received by:	FedEx		Date		1786522	
Relinquished by:	FedEx		Date	5/24/1015		
Received by:	Elisa Miller		Date	5/24/1015		

*See Attached for
Tracking # and Temp*

1

2 of 2

875403 CoC Print Group 001 of 001



ORIGIN ICBNAA (615) 769-5868
SHIPPING
PACE ANALYTICAL NATIONAL
12065 LEBANON PIKE
MOUNT JULIET, TN 37122

SHIP DATE: 23MAY19
ACTWT: 20.50 LB
CAD: 0361800/CAFE3211

UNITED STATES OF AMERICA
TO MS. TAYNA CHITWOOD
ANA LAB
2600 DUDLEY RD.

KILGORE TX 756623730
(615) 758-6859
REF: ANALABTX



**FRI - 24 MAY 3:00P
STANDARD OVERNIGHT**

75662
TX-U8 SHV

XX GGGG

Distance	Com. East	Temp.(C)	Time
6605	—	21.0	10:00
5643	20.1	21.0	10:00
6644	—	21.0	10:00
6933	—	21.0	10:00
	Day		10:00



Align Open End of FedEx Reach Neck

Report Prepared for:

Benita Miller
Pace Analytical National
12065 Lebanon Road
Mount Juliet TN 37122

**REPORT OF
LABORATORY
ANALYSIS FOR
PCDD/PCDF**

Report Prepared Date:

June 10, 2019

Report Information:

Pace Project #: 10476376

Sample Receipt Date: 05/24/2019

Client Project #: L1101422: WG1285623

Client Sub PO #: L1101422

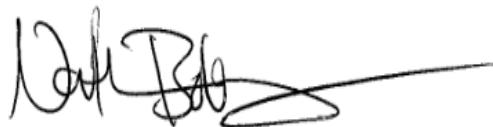
State Cert #: T104704192

Invoicing & Reporting Options:

The report provided has been invoiced as a Level 3 PCDD/PCDF Report. If an upgrade of this report package is requested, an additional charge may be applied.

Please review the attached invoice for accuracy and forward any questions to Nathan Boberg, your Pace Project Manager.

This report has been reviewed by:



June 10, 2019

Nathan Boberg, Project Manager
612-360-0728
(612) 607-6444 (fax)
nathan.boberg@pacelabs.com



Report of Laboratory Analysis

This report should not be reproduced, except in full, without the written consent of Pace Analytical Services, Inc.

The results relate only to the samples included in this report.



Pace Analytical Services, LLC.
1700 Elm Street
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

DISCUSSION

This report presents the results from the analysis performed on one sample submitted by a representative of Pace Analytical National. The sample was analyzed for the presence or absence of polychlorodibenzo-p-dioxins (PCDDs) and polychlorodibenzofurans (PCDFs) using USEPA Method 1613B. The reporting limits were based on signal-to-noise measurements. Estimated Maximum Possible Concentration (EMPC) values were treated as positives in the toxic equivalence calculations.

The recoveries of the isotopically-labeled PCDD/PCDF internal standards in the sample extract ranged from 75-105%. All of the labeled standard recoveries obtained for this project were within the target ranges specified in Method 1613B. Also, since the quantification of the native 2,3,7,8-substituted congeners was based on isotope dilution, the data were automatically corrected for recovery and accurate values were obtained. Concentrations below the calibration range were flagged "J" and should be regarded as estimates.

A laboratory method blank was prepared and analyzed with the sample batch as part of our routine quality control procedures. The results show the blank to contain a trace level of OCDD. This level was below the calibration range of the method. Also, OCDD was not detected in the field sample.

Laboratory spike samples were also prepared with the sample batch using clean reference matrix that had been fortified with native standard materials. The results show that the spiked native compounds were recovered at 86-103% with relative percent differences of 0.0-11.8%. These results were within the target ranges for the method. Matrix spikes were not prepared with the sample batch.

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Minnesota Laboratory Certifications

Authority	Certificate #	Authority	Certificate #
A2LA	2926.01	Minnesota - Pet	1240
Alabama	40770	Mississippi	MN00064
Alaska - DW	MN00064	Missouri - DW	10100
Alaska - UST	17-009	Montana	CERT0092
Arizona	AZ0014	Nebraska	NE-OS-18-06
Arkansas - DW	MN00064	Nevada	MN00064
Arkansas - WW	88-0680	New Hampshire	2081
CNMI Saipan	MP0003	New Jersey (NE	MN002
California	2929	New York	11647
Colorado	MN00064	North Carolina	27700
Connecticut	PH-0256	North Carolina -	27700
EPA Region 8+	via MN 027-053	North Carolina -	530
Florida (NELAP	E87605	North Dakota	R-036
Georgia	959	Ohio - DW	41244
Guam	17-001r	Ohio - VAP	CL101
Hawaii	MN00064	Oklahoma	9507
Idaho	MN00064	Oregon - Primar	MN300001
Illinois	200011	Oregon - Secon	MN200001
Indiana	C-MN-01	Pennsylvania	68-00563
Iowa	368	Puerto Rico	MN00064
Kansas	E-10167	South Carolina	74003
Kentucky - DW	90062	South Dakota	NA
Kentucky - WW	90062	Tennessee	TN02818
Louisiana - DE	03086	Texas	T104704192
Louisiana - DW	MN00064	Utah (NELAP)	MN00064
Maine	MN00064	Virginia	460163
Maryland	322	Washington	C486
Massachusetts	M-MN064	West Virginia -	382
Michigan	9909	West Virginia -	9952C
Minnesota	027-053-137	Wisconsin	999407970
Minnesota - De	via MN 027-053	Wyoming - UST	2926.01

REPORT OF LABORATORY ANALYSIS

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Report No.....10476376

Reporting Flags

- A = Reporting Limit based on signal to noise
- B = Less than 10x higher than method blank level
- C = Result obtained from confirmation analysis
- D = Result obtained from analysis of diluted sample
- E = Exceeds calibration range
- I = Interference present
- J = Estimated value
- L = Suppressive interference, analyte may be biased low
- Nn = Value obtained from additional analysis
- P = PCDEInterference
- R = Recovery outside target range
- S = Peak saturated
- U = Analyte not detected
- V = Result verified by confirmation analysis
- X = %D Exceeds limits
- Y = Calculated using average of daily RFs
- * = SeeDiscussion

REPORT OF LABORATORY ANALYSIS

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Report No.....10476376

Report No.....10476376_1613FC_DFR

Page 4 of 25

Appendix A

Sample Management



Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Sample ID Cross Reference

Client Sample ID

WW-20190520-002-DAY 18

Pace Sample ID

10476376001

Date Received

05/24/2019

Sample Type

Water

REPORT OF LABORATORY ANALYSIS

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HOP: 10476376

CHAIN-OF-CUSTODY /

The Chain-of-Custody is a LEGAL DOCUMENT

10476376

Page : 1 Of 1

Section A

Required Client Information:

Company: Pace Analytical National
 Address: 12065 Lebanon Road
 Mount Juliet, TN 37122
 Email: SuboutTeam@pacenational.com
 Phone: (615)773-9756 Fax: (615)758-5859
 Requested Due Date: 6-Jun

Purchase Order #: L1101422
 Project Name: Deer Park 002
 Project #: n/a



Document Name:
Sample Condition Upon Receipt Form
Document No.:
F-MN-L-213-rev.28

Document Revised: 09May2019
Page 1 of 1
Issuing Authority:
Pace Minnesota Quality Office

**Sample Condition
Upon Receipt**

Client Name:

Pace Analytical National

Project #:

WO# : 10476376

PM-NB3

Due Date: 06/10/19

CLIENT: ESC_LTN

Courier:

FedEx UPS USPS Client
 Pace SpeeDee Commercial See Exception

Tracking Number: *1023 1354 3710*

Custody Seal on Cooler/Box Present? Yes No

Seals Intact? Yes No

Biological Tissue Frozen? Yes No N/A

Packing Material: Bubble Wrap Bubble Bags None Other: _____

Temp Blank? Yes No

Thermometer: T1(0461) T2(1336) T3(0459)
 T4(0254) T5(0489)

Type of Ice: Wet Blue None Dry Melted

Note: Each West Virginia Sample must have temp taken (no temp blanks)

Temp should be above freezing to 6°C	Cooler Temp Read w/temp blank: <i>1.8</i> °C	Average Corrected Temp See Exceptions (no temp blank only): <i>MKZ S-24-19</i> °C
Correction Factor: <i>True</i>	Cooler Temp Corrected w/temp blank: <i>1.8</i> °C	

USDA Regulated Soil: (N/A, water sample/Other: _____)

Date/Initials of Person Examining Contents: *MKZ S-24-19*

Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)? Yes No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? Yes No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

	COMMENTS:		
Chain of Custody Present and Filled Out?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Chain of Custody Relinquished?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Sampler Name and/or Signature on COC?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A		
Samples Arrived within Hold Time?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Short Hold Time Analysis (<72 hr)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Rush Turn Around Time Requested?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Sufficient Volume?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Correct Containers Used? -Pace Containers Used?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Containers Intact?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Field Filtered Volume Received for Dissolved Tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A		
Is sufficient information available to reconcile the samples to the COC?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Matrix: <input checked="" type="checkbox"/> Water <input type="checkbox"/> Soil <input type="checkbox"/> Oil <input type="checkbox"/> Other			
All containers needing acid/base preservation have been checked?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A		
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO ₃ , H ₂ SO ₄ , <2pH, NaOH >9 Sulfide, NaOH>12 Cyanide)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A		
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS <i>PE 512416</i>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A		
Headspace in VOA Vials (greater than 6mm)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A		
Trip Blank Present?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A		
Trip Blank Custody Seals Present?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A		
12. Sample #			
□ NaOH □ HNO ₃ □ H ₂ SO ₄ □ Zinc Acetate			
Positive for Res. <input type="checkbox"/> Yes Chlorine? <input type="checkbox"/> No	See Exception		
pH Paper Lot#			
Res. Chlorine	0-6 Roll	0-6 Strip	0-14 Strip
13.		See Exception	
14. Pace Trip Blank Lot # (if purchased):			

CLIENT NOTIFICATION/RESOLUTION

Field Data Required? Yes No

Person Contacted: _____

Date/Time: _____

Comments/Resolution: _____

Project Manager Review: *Lathan Robberg*

Date: 5/24/19

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers).

Labeled by: *MZ*

Appendix B

Sample Analysis Summary



Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Method 1613B Sample Analysis Results

Client - Pace Analytical National

Client's Sample ID	WW-20190520-002-DAY 18		
Lab Sample ID	10476376001		
Filename	Y190607B_14		
Injected By	BAL		
Total Amount Extracted	972 mL	Matrix	Water
% Moisture	NA	Dilution	NA
Dry Weight Extracted	NA	Collected	05/20/2019 11:30
ICAL ID	Y190424	Received	05/24/2019 09:55
CCal Filename(s)	Y190607B_02	Extracted	06/05/2019 14:45
Method Blank ID	BLANK-70942	Analyzed	06/08/2019 07:18

Native Isomers	Conc pg/L	EMPC pg/L	EDL pg/L	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	0.49	2,3,7,8-TCDF-13C	2.00	91
Total TCDF	ND	----	0.49	2,3,7,8-TCDD-13C	2.00	94
1,2,3,7,8-TCDD	ND	----	0.90	1,2,3,7,8-PeCDF-13C	2.00	90
Total TCDD	ND	----	0.90	2,3,4,7,8-PeCDF-13C	2.00	88
1,2,3,7,8-PeCDF	ND	----	3.2	1,2,3,4,7,8-HxCDF-13C	2.00	91
2,3,4,7,8-PeCDF	ND	----	1.8	1,2,3,4,7,8-HxCDF-13C	2.00	95
Total PeCDF	ND	----	2.5	1,2,3,7,8-PeCDD-13C	2.00	105
1,2,3,7,8-PeCDD	ND	----	3.4	1,2,3,4,7,8-HxCDD-13C	2.00	81
Total PeCDD	ND	----	3.4	1,2,3,4,6,7,8-HpCDF-13C	2.00	90
1,2,3,4,7,8-HxCDF	ND	----	2.1	1,2,3,4,6,7,8-HpCDF-13C	2.00	89
1,2,3,6,7,8-HxCDF	ND	----	3.1	1,2,3,4,6,7,8-HpCDD-13C	2.00	96
2,3,4,6,7,8-HxCDF	ND	----	2.6	OCDD-13C	4.00	75
1,2,3,7,8,9-HxCDF	ND	----	2.4	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	----	2.5	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	4.8	2,3,7,8-TCDD-37Cl4	0.20	92
1,2,3,6,7,8-HxCDD	ND	----	4.3			
1,2,3,7,8,9-HxCDD	ND	----	4.5			
Total HxCDD	ND	----	4.5			
1,2,3,4,6,7,8-HpCDF	ND	----	1.2	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	1.7	Equivalence: 0.00 pg/L		
Total HpCDF	ND	----	1.5	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	ND	----	2.1			
Total HpCDD	ND	----	2.1			
OCDF	ND	----	4.5			
OCDD	ND	----	3.6			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).

ND = Not Detected

EMPC = Estimated Maximum Possible Concentration

NA = Not Applicable

EDL = Estimated Detection Limit

NC = Not Calculated

REPORT OF LABORATORY ANALYSIS

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2,3,7,8-TCDD Toxic Equivalency (TEQ) Calculations

Pace Analytical National

Client's Sample ID	WW-20190520-002-DAY 18		
Lab Sample ID	10476376001		
Filename	Y190607B_14		
Injected By	BAL		
Total Amount Extracted	972 mL	Matrix	Water
% Moisture	NA	Dilution	NA
Dry Weight Extracted	NA	Collected	05/20/2019 11:30
ICAL ID	Y190424	Received	05/24/2019 09:55
CCal Filename(s)	Y190607B_02	Extracted	06/05/2019 14:45
Method Blank ID	BLANK-70942	Analyzed	06/08/2019 07:18

Parameter	Conc pg/L	RL pg/L	WHO2005	LB	MB	UB
2,3,7,8-TCDF	ND	0.49	0.10000	0.0000	0.0243	0.0485
Total TCDF	ND	0.49	0.00000	0.0000	0.0000	0.0000
2,3,7,8-TCDD	ND	0.90	1.00000	0.0000	0.4511	0.9021
Total TCDD	ND	0.90	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDF	ND	3.2	0.03000	0.0000	0.0486	0.0971
2,3,4,7,8-PeCDF	ND	1.8	0.30000	0.0000	0.2644	0.5287
Total PeCDF	ND	2.5	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDD	ND	3.4	1.00000	0.0000	1.7106	3.4212
Total PeCDD	ND	3.4	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDF	ND	2.1	0.10000	0.0000	0.1050	0.2100
1,2,3,6,7,8-HxCDF	ND	3.1	0.10000	0.0000	0.1526	0.3053
2,3,4,6,7,8-HxCDF	ND	2.6	0.10000	0.0000	0.1295	0.2589
1,2,3,7,8,9-HxCDF	ND	2.4	0.10000	0.0000	0.1187	0.2375
Total HxCDF	ND	2.5	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDD	ND	4.8	0.10000	0.0000	0.2400	0.4800
1,2,3,6,7,8-HxCDD	ND	4.3	0.10000	0.0000	0.2133	0.4266
1,2,3,7,8,9-HxCDD	ND	4.5	0.10000	0.0000	0.2248	0.4497
Total HxCDD	ND	4.5	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDF	ND	1.2	0.01000	0.0000	0.0059	0.0119
1,2,3,4,7,8,9-HpCDF	ND	1.7	0.01000	0.0000	0.0087	0.0174
Total HpCDF	ND	1.5	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDD	ND	2.1	0.01000	0.0000	0.0106	0.0212
Total HpCDD	ND	2.1	0.00000	0.0000	0.0000	0.0000
OCDF	ND	4.5	0.00030	0.0000	0.0007	0.0013
OCDD	ND	3.6	0.00030	0.0000	0.0005	0.0011

0.00 pg/L 3.7 pg/L 7.4 pg/L

Final values are valid to only 2 significant figures

TEQs for Totals classes include contributions from non 2,3,7,8 isomers only

LB = Lower Bound, Where "ND", TEQ Conc = 0

MB = Medium Bound, Where "ND", TEQ Conc = (LOD/2) * (TEF Factor)

UB = Upper Bound, Where "ND", TEQ Conc = LOD * (TEF Factor)

RL = Reporting Limit

REPORT OF LABORATORY ANALYSIS

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Appendix C

QC and Calibration Results Summary

Method 1613B Blank Analysis Results

Lab Sample Name	DFBLKAP	Matrix	
Lab Sample ID	BLANK-70942	Dilution	Water
Filename	U190607A_04	Extracted	NA
Total Amount Extracted	891 mL	Analyzed	06/05/2019 14:45
ICAL ID	U190606	Injected By	06/07/2019 12:56
CCal Filename(s)	U190606C_14		ZMS

Native Isomers	Conc pg/L	EMPC pg/L	EDL pg/L	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	---	1.2	2,3,7,8-TCDF-13C	2.00	68
Total TCDF	ND	---	1.2	2,3,7,8-TCDD-13C	2.00	72
				1,2,3,7,8-PeCDF-13C	2.00	65
2,3,7,8-TCDD	ND	---	2.3	2,3,4,7,8-PeCDF-13C	2.00	63
Total TCDD	ND	---	2.3	1,2,3,7,8-PeCDD-13C	2.00	73
				1,2,3,4,7,8-HxCDF-13C	2.00	60
1,2,3,7,8-PeCDF	ND	---	1.6	1,2,3,6,7,8-HxCDF-13C	2.00	61
2,3,4,7,8-PeCDF	ND	---	1.1	2,3,4,6,7,8-HxCDF-13C	2.00	63
Total PeCDF	ND	---	1.3	1,2,3,7,8,9-HxCDF-13C	2.00	62
				1,2,3,4,7,8-HxCDD-13C	2.00	63
1,2,3,7,8-PeCDD	ND	---	1.8	1,2,3,6,7,8-HxCDD-13C	2.00	57
Total PeCDD	ND	---	1.8	1,2,3,4,6,7,8-HpCDF-13C	2.00	58
				1,2,3,4,7,8-HpCDF-13C	2.00	59
1,2,3,4,7,8-HxCDF	ND	---	1.6	1,2,3,4,6,7,8-HpCDD-13C	2.00	66
1,2,3,6,7,8-HxCDF	ND	---	1.5	OCDD-13C	4.00	51
2,3,4,6,7,8-HxCDF	ND	---	1.1			
1,2,3,7,8,9-HxCDF	ND	---	1.6	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	---	1.5	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	---	2.2	2,3,7,8-TCDD-37Cl4	0.20	84
1,2,3,6,7,8-HxCDD	ND	---	2.1			
1,2,3,7,8,9-HxCDD	ND	---	2.2			
Total HxCDD	ND	---	2.2			
1,2,3,4,6,7,8-HpCDF	ND	---	2.4	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	---	3.3	Equivalence: 0.0095 pg/L		
Total HpCDF	ND	---	2.9	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	ND	---	4.7			
Total HpCDD	ND	---	4.7			
OCDF	ND	---	4.7			
OCDD	32	---	9.5 J			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).

EMPC = Estimated Maximum Possible Concentration

EDL = Estimated Detection Limit

J = Estimated value

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2,3,7,8-TCDD Toxic Equivalency (TEQ) Calculations

Pace Analytical National

Client's Sample ID	DFBLKAP				
Lab Sample ID	BLANK-70942				
Filename	U190607A_04				
Injected By	ZMS				
Total Amount Extracted	891 mL		Matrix	Water	
% Moisture	NA		Dilution	NA	
Dry Weight Extracted	NA		Collected	06/04/2019 16:48	
ICAL ID	U190606		Received	06/04/2019 16:48	
CCal Filename(s)	U190606C_14		Extracted	06/05/2019 14:45	
Method Blank ID			Analyzed	06/07/2019 12:56	

Parameter	Conc pg/L	RL pg/L	WHO2005	LB	MB	UB
2,3,7,8-TCDF	ND	1.2	0.10000	0.0000	0.0583	0.1166
Total TCDF	ND	1.2	0.00000	0.0000	0.0000	0.0000
2,3,7,8-TCDD	ND	2.3	1.00000	0.0000	1.1422	2.2844
Total TCDD	ND	2.3	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDF	ND	1.6	0.03000	0.0000	0.0233	0.0466
2,3,4,7,8-PeCDF	ND	1.1	0.30000	0.0000	0.1679	0.3357
Total PeCDF	ND	1.3	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDD	ND	1.8	1.00000	0.0000	0.9113	1.8226
Total PeCDD	ND	1.8	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDF	ND	1.6	0.10000	0.0000	0.0822	0.1644
1,2,3,6,7,8-HxCDF	ND	1.5	0.10000	0.0000	0.0741	0.1482
2,3,4,6,7,8-HxCDF	ND	1.1	0.10000	0.0000	0.0552	0.1104
1,2,3,7,8,9-HxCDF	ND	1.6	0.10000	0.0000	0.0798	0.1595
Total HxCDF	ND	1.5	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDD	ND	2.2	0.10000	0.0000	0.1079	0.2159
1,2,3,6,7,8-HxCDD	ND	2.1	0.10000	0.0000	0.1039	0.2079
1,2,3,7,8,9-HxCDD	ND	2.2	0.10000	0.0000	0.1116	0.2232
Total HxCDD	ND	2.2	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDF	ND	2.4	0.01000	0.0000	0.0121	0.0243
1,2,3,4,7,8,9-HpCDF	ND	3.3	0.01000	0.0000	0.0165	0.0331
Total HpCDF	ND	2.9	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDD	ND	4.7	0.01000	0.0000	0.0237	0.0475
Total HpCDD	ND	4.7	0.00000	0.0000	0.0000	0.0000
OCDF	ND	4.7	0.00030	0.0000	0.0007	0.0014
OCDD	32	9.5	0.00030	0.0095	0.0095	0.0095

0.0095 pg/L 3.0 pg/L 6.0 pg/L

Final values are valid to only 2 significant figures

TEQs for Totals classes include contributions from non 2,3,7,8 isomers only

LB = Lower Bound, Where "ND", TEQ Conc = 0

MB = Medium Bound, Where "ND", TEQ Conc = (LOD/2) * (TEF Factor)

UB = Upper Bound, Where "ND", TEQ Conc = LOD * (TEF Factor)

RL = Reporting Limit

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Method 1613B Laboratory Control Spike Results

Lab Sample ID	LCS-70943	Matrix	Water
Filename	U190607A_01	Dilution	NA
Total Amount Extracted	931 mL	Extracted	06/05/2019 14:45
ICAL ID	U190606	Analyzed	06/07/2019 10:43
CCal Filename	U190606C_14	Injected By	ZMS
Method Blank ID	BLANK-70942		

Compound	Cs	Cr	Lower Limit	Upper Limit	% Rec.
2,3,7,8-TCDF	10	8.8	7.5	15.8	88
2,3,7,8-TCDD	10	9.9	6.7	15.8	99
1,2,3,7,8-PeCDF	50	45	40.0	67.0	90
2,3,4,7,8-PeCDF	50	46	34.0	80.0	91
1,2,3,7,8-PeCDD	50	44	35.0	71.0	88
1,2,3,4,7,8-HxCDF	50	48	36.0	67.0	97
1,2,3,6,7,8-HxCDF	50	47	42.0	65.0	94
2,3,4,6,7,8-HxCDF	50	46	35.0	78.0	92
1,2,3,7,8,9-HxCDF	50	49	39.0	65.0	99
1,2,3,4,7,8-HxCDD	50	48	35.0	82.0	95
1,2,3,6,7,8-HxCDD	50	50	38.0	67.0	99
1,2,3,7,8,9-HxCDD	50	49	32.0	81.0	99
1,2,3,4,6,7,8-HpCDF	50	50	41.0	61.0	101
1,2,3,4,7,8,9-HpCDF	50	47	39.0	69.0	93
1,2,3,4,6,7,8-HpCDD	50	44	35.0	70.0	87
OCDF	100	88	63.0	170.0	88
OCDD	100	100	78.0	144.0	102
2,3,7,8-TCDD-37Cl4	10	11	3.1	19.1	106
2,3,7,8-TCDF-13C	100	94	22.0	152.0	94
2,3,7,8-TCDD-13C	100	98	20.0	175.0	98
1,2,3,7,8-PeCDF-13C	100	91	21.0	192.0	91
2,3,4,7,8-PeCDF-13C	100	89	13.0	328.0	89
1,2,3,7,8-PeCDD-13C	100	100	21.0	227.0	102
1,2,3,4,7,8-HxCDF-13C	100	75	19.0	202.0	75
1,2,3,6,7,8-HxCDF-13C	100	76	21.0	159.0	76
2,3,4,6,7,8-HxCDF-13C	100	80	22.0	176.0	80
1,2,3,7,8,9-HxCDF-13C	100	76	17.0	205.0	76
1,2,3,4,7,8-HxCDD-13C	100	82	21.0	193.0	82
1,2,3,6,7,8-HxCDD-13C	100	75	25.0	163.0	75
1,2,3,4,6,7,8-HpCDF-13C	100	75	21.0	158.0	75
1,2,3,4,7,8,9-HpCDF-13C	100	82	20.0	186.0	82
1,2,3,4,6,7,8-HpCDD-13C	100	88	26.0	166.0	88
OCDD-13C	200	140	26.0	397.0	68

Cs = Concentration Spiked (ng/mL)

Cr = Concentration Recovered (ng/mL)

Rec. = Recovery (Expressed as Percent)

Control Limit Reference: Method 1613, Table 6, 10/94 Revision

R = Recovery outside of control limits

Nn = Value obtained from additional analysis

* = See Discussion

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Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Method 1613B Laboratory Control Spike Results

Lab Sample ID	LCSD-70944	Matrix	Water
Filename	U190607A_02	Dilution	NA
Total Amount Extracted	943 mL	Extracted	06/05/2019 14:45
ICAL ID	U190606	Analyzed	06/07/2019 11:26
CCal Filename	U190606C_14	Injected By	ZMS
Method Blank ID	BLANK-70942		

Compound	Cs	Cr	Lower Limit	Upper Limit	% Rec.
2,3,7,8-TCDF	10	9.2	7.5	15.8	92
2,3,7,8-TCDD	10	9.9	6.7	15.8	99
1,2,3,7,8-PeCDF	50	46	40.0	67.0	92
2,3,4,7,8-PeCDF	50	46	34.0	80.0	92
1,2,3,7,8-PeCDD	50	43	35.0	71.0	86
1,2,3,4,7,8-HxCDF	50	49	36.0	67.0	98
1,2,3,6,7,8-HxCDF	50	47	42.0	65.0	94
2,3,4,6,7,8-HxCDF	50	45	35.0	78.0	89
1,2,3,7,8,9-HxCDF	50	44	39.0	65.0	88
1,2,3,4,7,8-HxCDD	50	49	35.0	82.0	98
1,2,3,6,7,8-HxCDD	50	49	38.0	67.0	98
1,2,3,7,8,9-HxCDD	50	52	32.0	81.0	103
1,2,3,4,6,7,8-HpCDF	50	49	41.0	61.0	98
1,2,3,4,7,8,9-HpCDF	50	50	39.0	69.0	99
1,2,3,4,6,7,8-HpCDD	50	45	35.0	70.0	90
OCDF	100	90	63.0	170.0	90
OCDD	100	97	78.0	144.0	97
2,3,7,8-TCDD-37Cl4	10	9.6	3.1	19.1	96
2,3,7,8-TCDF-13C	100	82	22.0	152.0	82
2,3,7,8-TCDD-13C	100	87	20.0	175.0	87
1,2,3,7,8-PeCDF-13C	100	78	21.0	192.0	78
2,3,4,7,8-PeCDF-13C	100	79	13.0	328.0	79
1,2,3,7,8-PeCDD-13C	100	89	21.0	227.0	89
1,2,3,4,7,8-HxCDF-13C	100	77	19.0	202.0	77
1,2,3,6,7,8-HxCDF-13C	100	77	21.0	159.0	77
2,3,4,6,7,8-HxCDF-13C	100	82	22.0	176.0	82
1,2,3,7,8,9-HxCDF-13C	100	82	17.0	205.0	82
1,2,3,4,7,8-HxCDD-13C	100	81	21.0	193.0	81
1,2,3,6,7,8-HxCDD-13C	100	73	25.0	163.0	73
1,2,3,4,6,7,8-HpCDF-13C	100	77	21.0	158.0	77
1,2,3,4,7,8,9-HpCDF-13C	100	77	20.0	186.0	77
1,2,3,4,6,7,8-HpCDD-13C	100	89	26.0	166.0	89
OCDD-13C	200	140	26.0	397.0	68

Cs = Concentration Spiked (ng/mL)

Cr = Concentration Recovered (ng/mL)

Rec. = Recovery (Expressed as Percent)

Control Limit Reference: Method 1613, Table 6, 10/94 Revision

R = Recovery outside of control limits

Nn = Value obtained from additional analysis

* = See Discussion

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Method 1613B

Spike Recovery Relative Percent Difference (RPD) Results

Client Pace Analytical National

Spike 1 ID	LCS-70943	Spike 2 ID	LCSD-70944
Spike 1 Filename	U190607A_01	Spike 2 Filename	U190607A_02

Compound	Spike 1 %REC	Spike 2 %REC	%RPD
2,3,7,8-TCDF	88	92	4.4
2,3,7,8-TCDD	99	99	0.0
1,2,3,7,8-PeCDF	90	92	2.2
2,3,4,7,8-PeCDF	91	92	1.1
1,2,3,7,8-PeCDD	88	86	2.3
1,2,3,4,7,8-HxCDF	97	98	1.0
1,2,3,6,7,8-HxCDF	94	94	0.0
2,3,4,6,7,8-HxCDF	92	89	3.3
1,2,3,7,8,9-HxCDF	99	88	11.8
1,2,3,4,7,8-HxCDD	95	98	3.1
1,2,3,6,7,8-HxCDD	99	98	1.0
1,2,3,7,8,9-HxCDD	99	103	4.0
1,2,3,4,6,7,8-HpCDF	101	98	3.0
1,2,3,4,7,8,9-HpCDF	93	99	6.3
1,2,3,4,6,7,8-HpCDD	87	90	3.4
OCDF	88	90	2.2
OCDD	102	97	5.0

%REC = Percent Recovered

RPD = The difference between the two values divided by the mean value

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Method 1613B
Initial Calibration (ICAL) - Response Factor Summary

ICAL ID	U190606	Data Files:			Time	Injected		
Calibration Date	06/06/2019	CS-1	U190606B_01	13:16	ZMS			
Instrument	10MSHR06 (U)	CS-2	U190606B_02	14:15	ZMS			
Column Phase	ZB-5MS 0.25mm	CS-3	U190606B_03	15:09	ZMS			
Column ID No.	1010640	CS-4	U190606B_05	16:37	ZMS			
		CS-5	U190606B_04	15:52	ZMS			
Isomer		CS-1	CS-2	CS-3	CS-4	CS-5	Ave RF	%RSD
2,3,7,8-TCDF		0.7233	0.8366	0.7756	0.8110	0.8380	0.7969	6.06
2,3,7,8-TCDD		0.7688	0.8728	0.8864	0.8212	0.8526	0.8404	5.58
1,2,3,7,8-PeCDF		0.7598	0.7323	0.8055	0.7876	0.8039	0.7778	4.03
2,3,4,7,8-PeCDF		0.8434	0.8428	0.8635	0.8895	0.8960	0.8671	2.88
1,2,3,7,8-PeCDD		0.7152	0.7340	0.7609	0.7879	0.8219	0.7640	5.56
1,2,3,4,7,8-HxCDF		0.9037	0.9678	0.9875	0.9969	1.0333	0.9778	4.88
1,2,3,6,7,8-HxCDF		0.8686	0.8944	0.9603	0.9464	0.9456	0.9231	4.28
2,3,4,6,7,8-HxCDF		0.9634	0.9660	1.0169	1.0612	1.0303	1.0075	4.20
1,2,3,7,8,9-HxCDF		0.8621	0.9073	0.9328	0.9540	0.9809	0.9274	4.90
1,2,3,4,7,8-HxCDD		0.8109	0.8158	0.8520	0.8090	0.8784	0.8332	3.69
1,2,3,6,7,8-HxCDD		0.7803	0.7871	0.8061	0.9085	0.8384	0.8241	6.35
1,2,3,7,8,9-HxCDD		0.8345	0.8568	0.8494	0.8650	0.8526	0.8517	1.32
1,2,3,4,6,7,8-HpCDF		1.0437	1.0916	1.1576	1.2020	1.1845	1.1359	5.85
1,2,3,4,7,8,9-HpCDF		0.9947	1.0729	1.2276	1.1502	1.2317	1.1354	8.99
1,2,3,4,6,7,8-HpCDD		0.8974	0.9148	1.0268	1.0602	1.0256	0.9849	7.47
OCDF		0.7915	0.8477	0.8479	0.9085	0.9132	0.8618	5.85
OCDD		0.8675	0.8663	0.8707	0.9392	0.9586	0.9004	4.97
Total PeCDF		0.8016	0.7876	0.8345	0.8386	0.8500	0.8224	3.22
Total HxCDF		0.8994	0.9339	0.9744	0.9896	0.9975	0.9590	4.31
Total HxCDD		0.8086	0.8199	0.8358	0.8608	0.8565	0.8363	2.71
Total HpCDF		1.0192	1.0823	1.1926	1.1761	1.2081	1.1356	7.17
2,3,7,8-TCDF-13C		1.1748	1.1742	1.1828	1.1906	1.1591	1.1763	1.00
2,3,7,8-TCDD-13C		1.0358	1.0204	1.0591	1.0014	1.0281	1.0290	2.05
2,3,7,8-TCDD-37Cl4		1.0452	1.0088	0.9501	0.9812	1.0056	0.9982	3.53
1,2,3,7,8-PeCDF-13C		0.8890	0.8781	0.8125	0.8498	0.9072	0.8673	4.27
2,3,4,7,8-PeCDF-13C		0.9259	0.8651	0.8496	0.8444	0.9235	0.8817	4.53
1,2,3,7,8-PeCDD-13C		0.7586	0.7078	0.6881	0.6550	0.7298	0.7079	5.58
1,2,3,4,7,8-HxCDF-13C		0.8405	0.8137	0.7771	0.9056	0.8760	0.8426	6.00
1,2,3,6,7,8-HxCDF-13C		1.1036	1.1334	1.0347	1.2476	1.2202	1.1479	7.57
2,3,4,6,7,8-HxCDF-13C		0.9260	0.9208	0.8615	1.0003	0.9881	0.9394	5.99
1,2,3,7,8,9-HxCDF-13C		0.7633	0.7582	0.7201	0.8260	0.8132	0.7762	5.57
1,2,3,4,7,8-HxCDD-13C		0.7774	0.7584	0.7051	0.9018	0.8971	0.8079	10.85
1,2,3,6,7,8-HxCDD-13C		1.1491	1.1707	1.0901	1.1662	1.2032	1.1559	3.60
1,2,3,4,6,7,8-HpCDF-13C		1.1538	1.1701	1.0997	1.2131	1.2288	1.1731	4.36
1,2,3,4,7,8,9-HpCDF-13C		0.8461	0.8197	0.7783	0.8848	0.8868	0.8431	5.43
1,2,3,4,6,7,8-HpCDD-13C		0.9971	0.9812	0.9048	0.9498	1.0050	0.9676	4.23
OCDD-13C		0.6380	0.6223	0.6594	0.6901	0.7477	0.6715	7.39

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Method 1613B
Initial Calibration (ICAL) - Isotope Ratio Summary

ICAL ID	U190606	Data Files:	Time	Injected	
Calibration Date	06/06/2019	CS-1	U190606B_01	13:16	ZMS
Instrument	10MSHR06 (U)	CS-2	U190606B_02	14:15	ZMS
Column Phase	ZB-5MS 0.25mm	CS-3	U190606B_03	15:09	ZMS
Column ID No.	1010640	CS-4	U190606B_05	16:37	ZMS
		CS-5	U190606B_04	15:52	ZMS

Isomer	CS-1	CS-2	CS-3	CS-4	CS-5	Limits
2,3,7,8-TCDF	0.77	0.78	0.78	0.75	0.75	0.65 - 0.89
2,3,7,8-TCDD	0.67	0.79	0.77	0.76	0.75	0.65 - 0.89
1,2,3,7,8-PeCDF	1.57	1.48	1.53	1.47	1.53	1.32 - 1.78
2,3,4,7,8-PeCDF	1.49	1.61	1.55	1.50	1.51	1.32 - 1.78
1,2,3,7,8-PeCDD	0.67	0.60	0.61	0.60	0.61	0.52 - 0.70
1,2,3,4,7,8-HxCDF	1.21	1.20	1.20	1.21	1.21	1.05 - 1.43
1,2,3,6,7,8-HxCDF	1.26	1.17	1.30	1.21	1.21	1.05 - 1.43
2,3,4,6,7,8-HxCDF	1.20	1.24	1.23	1.17	1.17	1.05 - 1.43
1,2,3,7,8,9-HxCDF	1.22	1.19	1.23	1.27	1.19	1.05 - 1.43
1,2,3,4,7,8-HxCDD	1.25	1.16	1.21	1.22	1.23	1.05 - 1.43
1,2,3,6,7,8-HxCDD	1.25	1.34	1.22	1.24	1.22	1.05 - 1.43
1,2,3,7,8,9-HxCDD	1.15	1.13	1.27	1.20	1.19	1.05 - 1.43
1,2,3,4,6,7,8-HpCDF	0.95	1.06	0.93	1.08	1.03	0.88 - 1.20
1,2,3,4,7,8,9-HpCDF	0.99	1.05	1.08	1.04	1.05	0.88 - 1.20
1,2,3,4,6,7,8-HpCDD	1.04	0.98	1.00	1.04	1.10	0.88 - 1.20
OCDF	0.91	0.87	0.90	0.83	0.87	0.76 - 1.02
OCDD	0.91	0.89	0.81	0.88	0.92	0.76 - 1.02
1,2,3,4-TCDD-13C	0.78	0.78	0.79	0.78	0.78	0.65 - 0.89
1,2,3,7,8,9-HxCDD-13C	1.21	1.27	1.25	1.25	1.21	1.05 - 1.43
2,3,7,8-TCDF-13C	0.75	0.77	0.74	0.76	0.75	0.65 - 0.89
2,3,7,8-TCDD-13C	0.79	0.76	0.78	0.76	0.79	0.65 - 0.89
1,2,3,7,8-PeCDF-13C	1.53	1.54	1.54	1.54	1.58	1.32 - 1.78
2,3,4,7,8-PeCDF-13C	1.49	1.51	1.57	1.53	1.58	1.32 - 1.78
1,2,3,7,8-PeCDD-13C	1.55	1.52	1.55	1.52	1.56	1.32 - 1.78
1,2,3,4,7,8-HxCDF-13C	0.50	0.50	0.50	0.51	0.50	0.43 - 0.59
1,2,3,6,7,8-HxCDF-13C	0.52	0.50	0.50	0.51	0.51	0.43 - 0.59
2,3,4,6,7,8-HxCDF-13C	0.51	0.52	0.50	0.51	0.50	0.43 - 0.59
1,2,3,7,8,9-HxCDF-13C	0.52	0.53	0.48	0.47	0.49	0.43 - 0.59
1,2,3,4,7,8-HxCDD-13C	1.21	1.25	1.27	1.21	1.21	1.05 - 1.43
1,2,3,6,7,8-HxCDD-13C	1.22	1.25	1.22	1.26	1.24	1.05 - 1.43
1,2,3,4,6,7,8-HpCDF-13C	0.44	0.44	0.46	0.43	0.46	0.37 - 0.51
1,2,3,4,7,8-HpCDF-13C	0.45	0.46	0.48	0.42	0.44	0.37 - 0.51
1,2,3,4,6,7,8-HpCDD-13C	1.10	1.04	1.01	1.07	1.09	0.88 - 1.20
OCDD-13C	0.88	0.87	0.84	0.84	0.88	0.76 - 1.02

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Method 1613B
Initial Calibration (ICAL) - Response Factor Summary

ICAL ID	Y190424	Data Files:			Time	Injected
Calibration Date	04/24/2019	CS-1	Y190424A_03	09:24	SMT	
Instrument	10MSHR12 (Y)	CS-2	Y190424A_02	08:38	SMT	
Column Phase	ZB-5MS 0.25mm	CS-3	Y190424A_01	07:53	SMT	
Column ID No.	629920	CS-4	Y190424A_05	11:02	SMT	
		CS-5	Y190424A_04	10:17	SMT	
Isomer		CS-1	CS-2	CS-3	CS-4	CS-5
					Ave RF	%RSD
2,3,7,8-TCDF		0.8729	0.8432	0.8526	0.8809	0.8677
2,3,7,8-TCDD		0.8562	0.8631	1.0213	0.9314	0.9243
1,2,3,7,8-PeCDF		0.8497	0.8338	0.9059	0.8703	0.8977
2,3,4,7,8-PeCDF		0.9341	0.9523	0.9597	0.9958	1.0220
1,2,3,7,8-PeCDD		0.8708	0.8847	0.8802	0.8955	0.9296
1,2,3,4,7,8-HxCDF		1.1439	1.0967	1.1776	1.1920	1.2166
1,2,3,6,7,8-HxCDF		1.0426	1.0679	1.1267	1.1055	1.1348
2,3,4,6,7,8-HxCDF		1.1427	1.1191	1.1823	1.1952	1.1819
1,2,3,7,8,9-HxCDF		1.1115	1.0464	1.0803	1.1213	1.1439
1,2,3,4,7,8-HxCDD		0.8497	0.8896	0.9286	0.9506	0.9602
1,2,3,6,7,8-HxCDD		0.9208	0.9452	0.9241	0.9304	0.9459
1,2,3,7,8,9-HxCDD		0.8968	0.8994	0.9503	0.9396	0.9360
1,2,3,4,6,7,8-HpCDF		1.2000	1.2714	1.2416	1.2860	1.2831
1,2,3,4,7,8,9-HpCDF		1.2820	1.2744	1.2895	1.3181	1.3172
1,2,3,4,6,7,8-HpCDD		0.9267	0.9265	0.9872	1.0193	0.9930
OCDF		1.1150	1.0519	1.0618	1.1832	1.1582
OCDD		0.9688	0.9932	0.9766	1.0446	1.0045
Total PeCDF		0.8919	0.8930	0.9328	0.9331	0.9599
Total HxCDF		1.1101	1.0825	1.1417	1.1535	1.1693
Total HxCDD		0.8891	0.9114	0.9343	0.9402	0.9473
Total HpCDF		1.2410	1.2729	1.2655	1.3020	1.3002
2,3,7,8-TCDF-13C		1.4049	1.4326	1.4451	1.3939	1.4340
2,3,7,8-TCDD-13C		1.0663	1.1017	1.1494	1.0553	1.1115
2,3,7,8-TCDD-37Cl4		1.0375	1.0723	1.1203	1.0857	1.1501
1,2,3,7,8-PeCDF-13C		1.0503	1.0587	1.0139	1.0630	1.1470
2,3,4,7,8-PeCDF-13C		1.0164	1.0405	1.0773	1.0337	1.1320
1,2,3,7,8-PeCDD-13C		0.7177	0.7227	0.7651	0.7403	0.8302
1,2,3,4,7,8-HxCDF-13C		1.0423	1.0440	0.8810	1.0422	0.9857
1,2,3,6,7,8-HxCDF-13C		1.1538	1.1790	0.9850	1.1883	1.1393
2,3,4,6,7,8-HxCDF-13C		1.1032	1.0959	0.9475	1.1004	1.0598
1,2,3,7,8,9-HxCDF-13C		0.9479	0.9666	0.8920	0.9829	0.9583
1,2,3,4,7,8-HxCDD-13C		0.9555	0.9770	0.8521	0.9886	0.9648
1,2,3,6,7,8-HxCDD-13C		1.0622	1.0827	0.9902	1.0797	1.0742
1,2,3,4,6,7,8-HpCDF-13C		1.0365	1.0626	0.9680	1.0737	1.0649
1,2,3,4,7,8,9-HpCDF-13C		0.8316	0.8411	0.7866	0.8572	0.8769
1,2,3,4,6,7,8-HpCDD-13C		0.8976	0.9280	0.8651	0.9239	0.9580
OCDD-13C		0.6505	0.6988	0.6782	0.7086	0.7707
						0.7014
						6.37

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Method 1613B
Initial Calibration (ICAL) - Isotope Ratio Summary

ICAL ID	Y190424	Data Files:	Time	Injected	
Calibration Date	04/24/2019	CS-1	Y190424A_03	09:24	SMT
Instrument	10MSHR12 (Y)	CS-2	Y190424A_02	08:38	SMT
Column Phase	ZB-5MS 0.25mm	CS-3	Y190424A_01	07:53	SMT
Column ID No.	629920	CS-4	Y190424A_05	11:02	SMT
		CS-5	Y190424A_04	10:17	SMT

Isomer	CS-1	CS-2	CS-3	CS-4	CS-5	Limits
2,3,7,8-TCDF	0.83	0.83	0.77	0.77	0.78	0.65 - 0.89
2,3,7,8-TCDD	0.83	0.80	0.76	0.77	0.77	0.65 - 0.89
1,2,3,7,8-PeCDF	1.43	1.56	1.53	1.53	1.55	1.32 - 1.78
2,3,4,7,8-PeCDF	1.53	1.60	1.54	1.59	1.56	1.32 - 1.78
1,2,3,7,8-PeCDD	0.65	0.62	0.61	0.60	0.61	0.52 - 0.70
1,2,3,4,7,8-HxCDF	1.26	1.27	1.26	1.27	1.27	1.05 - 1.43
1,2,3,6,7,8-HxCDF	1.26	1.30	1.26	1.27	1.29	1.05 - 1.43
2,3,4,6,7,8-HxCDF	1.26	1.27	1.26	1.28	1.25	1.05 - 1.43
1,2,3,7,8,9-HxCDF	1.16	1.18	1.26	1.25	1.26	1.05 - 1.43
1,2,3,4,7,8-HxCDD	1.18	1.22	1.24	1.24	1.22	1.05 - 1.43
1,2,3,6,7,8-HxCDD	1.30	1.26	1.25	1.23	1.23	1.05 - 1.43
1,2,3,7,8,9-HxCDD	1.31	1.24	1.26	1.23	1.22	1.05 - 1.43
1,2,3,4,6,7,8-HpCDF	1.14	1.11	1.04	1.04	1.03	0.88 - 1.20
1,2,3,4,7,8,9-HpCDF	0.96	1.11	1.00	1.05	1.02	0.88 - 1.20
1,2,3,4,6,7,8-HpCDD	1.03	1.05	1.05	1.03	1.05	0.88 - 1.20
OCDF	0.85	0.88	0.91	0.87	0.90	0.76 - 1.02
OCDD	0.76	0.91	0.88	0.88	0.89	0.76 - 1.02
1,2,3,4-TCDD-13C	0.78	0.78	0.79	0.78	0.80	0.65 - 0.89
1,2,3,7,8,9-HxCDD-13C	1.24	1.25	1.23	1.25	1.24	1.05 - 1.43
2,3,7,8-TCDF-13C	0.79	0.78	0.76	0.76	0.77	0.65 - 0.89
2,3,7,8-TCDD-13C	0.79	0.77	0.79	0.78	0.78	0.65 - 0.89
1,2,3,7,8-PeCDF-13C	1.53	1.56	1.55	1.56	1.57	1.32 - 1.78
2,3,4,7,8-PeCDF-13C	1.54	1.54	1.55	1.57	1.55	1.32 - 1.78
1,2,3,7,8-PeCDD-13C	1.56	1.55	1.59	1.59	1.61	1.32 - 1.78
1,2,3,4,7,8-HxCDF-13C	0.52	0.51	0.52	0.51	0.52	0.43 - 0.59
1,2,3,6,7,8-HxCDF-13C	0.52	0.51	0.54	0.51	0.51	0.43 - 0.59
2,3,4,6,7,8-HxCDF-13C	0.51	0.52	0.50	0.51	0.51	0.43 - 0.59
1,2,3,7,8,9-HxCDF-13C	0.52	0.53	0.52	0.50	0.50	0.43 - 0.59
1,2,3,4,7,8-HxCDD-13C	1.26	1.25	1.25	1.26	1.26	1.05 - 1.43
1,2,3,6,7,8-HxCDD-13C	1.23	1.21	1.22	1.25	1.24	1.05 - 1.43
1,2,3,4,6,7,8-HpCDF-13C	0.45	0.45	0.45	0.44	0.44	0.37 - 0.51
1,2,3,4,7,8-HpCDF-13C	0.44	0.45	0.46	0.44	0.45	0.37 - 0.51
1,2,3,4,6,7,8-HpCDD-13C	1.04	1.01	1.04	1.03	1.03	0.88 - 1.20
OCDD-13C	0.88	0.91	0.89	0.88	0.89	0.76 - 1.02

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Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

**Method 1613B Analysis Results
PCDD/PCDF Calibration Verification
Labeled Analytes**

Lab Name CS3/CPM-11321-155
Filename U190606C_14
Injected By ZMS
Analyzed 06/07/2019 09:47

Instrument ID 10MSHR06 (U)
GC Column ID 1010640
ICAL ID U190606

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
Labeled Compounds					
1,2,3,4-TCDD-13C	M/M+2	0.77	0.65 - 0.89	----	----
2,3,7,8-TCDD-13C	M/M+2	0.77	0.65 - 0.89	103.0	82 - 121
1,2,3,7,8-PeCDD-13C	M+2/M+4	1.55	1.32 - 1.78	99.2	62 - 160
1,2,3,4,7,8-HxCDD-13C	M+2/M+4	1.23	1.05 - 1.43	91.3	85 - 117
1,2,3,6,7,8-HxCDD-13C	M+2/M+4	1.21	1.05 - 1.43	90.7	85 - 118
1,2,3,7,8,9-HxCDD-13C	M+2/M+4	1.23	1.05 - 1.43	----	----
1,2,3,4,6,7,8-HpCDD-13C	M+2/M+4	1.02	0.88 - 1.20	99.5	72 - 138
OCDD-13C	M+2/M+4	0.89	0.76 - 1.02	186.4	96 - 415
2,3,7,8-TCDF-13C	M/M+2	0.75	0.65 - 0.89	95.2	71 - 140
1,2,3,7,8-PeCDF-13C	M+2/M+4	1.53	1.32 - 1.78	88.3	76 - 130
2,3,4,7,8-PeCDF-13C	M+2/M+4	1.51	1.32 - 1.78	93.4	77 - 130
1,2,3,4,7,8-HxCDF-13C	M/M+2	0.50	0.43 - 0.59	89.2	76 - 131
1,2,3,6,7,8-HxCDF-13C	M/M+2	0.52	0.43 - 0.59	82.8	70 - 143
2,3,4,6,7,8-HxCDF-13C	M/M+2	0.52	0.43 - 0.59	87.3	73 - 137
1,2,3,7,8,9-HxCDF-13C	M/M+2	0.51	0.43 - 0.59	88.1	74 - 135
1,2,3,4,6,7,8-HpCDF-13C	M/M+2	0.44	0.37 - 0.51	95.8	78 - 129
1,2,3,4,7,8,9-HpCDF-13C	M/M+2	0.42	0.37 - 0.51	92.4	77 - 129
Cleanup Standard					
2,3,7,8-TCDD-37Cl4	M+2/M+4	(4)		9.6	7.9 - 12.7

1. See Table 8, Method 1613, for m/z specifications.
2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.
3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).
4. No ion abundance ratio; report concentration found.

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**Method 1613B Analysis Results
PCDD/PCDF Calibration Verification
Native Analytes**

Lab Name CS3/CPM-11321-155
Filename U190606C_14
Injected By ZMS
Analyzed 06/07/2019 09:47

Instrument ID 10MSHR06 (U)
GC Column ID 1010640
ICAL ID U190606

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
2,3,7,8-TCDD	M/M+2	0.76	0.65 - 0.89	10.8	7.8 - 12.9
1,2,3,7,8-PeCDD	M+2/M+4	0.61	0.52 - 0.70	47.5	39 - 65
1,2,3,4,7,8-HxCDD	M+2/M+4	1.21	1.05 - 1.43	50.5	39 - 64
1,2,3,6,7,8-HxCDD	M+2/M+4	1.23	1.05 - 1.43	48.2	39 - 64
1,2,3,7,8,9-HxCDD	M+2/M+4	1.27	1.05 - 1.43	48.9	41 - 61
1,2,3,4,6,7,8-HpCDD	M+2/M+4	1.01	0.88 - 1.20	50.0	43 - 58
OCDD	M+2/M+4	0.84	0.76 - 1.02	93.7	79 - 126
2,3,7,8-TCDF	M/M+2	0.75	0.65 - 0.89	9.9	8.4 - 12.0
1,2,3,7,8-PeCDF	M+2/M+4	1.41	1.32 - 1.78	49.2	41 - 60
2,3,4,7,8-PeCDF	M+2/M+4	1.46	1.32 - 1.78	47.5	41 - 61
1,2,3,4,7,8-HxCDF	M+2/M+4	1.20	1.05 - 1.43	47.1	45 - 56
1,2,3,6,7,8-HxCDF	M+2/M+4	1.20	1.05 - 1.43	49.2	44 - 57
2,3,4,6,7,8-HxCDF	M+2/M+4	1.18	1.05 - 1.43	47.3	44 - 57
1,2,3,7,8,9-HxCDF	M+2/M+4	1.11	1.05 - 1.43	48.3	45 - 56
1,2,3,4,6,7,8-HpCDF	M+2/M+4	1.03	0.88 - 1.20	47.9	45 - 55
1,2,3,4,7,8,9-HpCDF	M+2/M+4	1.05	0.88 - 1.20	50.1	43 - 58
OCDF	M+2/M+4	0.88	0.76 - 1.02	89.4	63 - 159

1. See Table 8, Method 1613, for m/z specifications.
2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.
3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).

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**Method 1613B Analysis Results
PCDD/PCDF Calibration Verification
Labeled Analytes**

Lab Name CS3/CPM-11321-155
Filename Y190607B_02
Injected By BAL
Analyzed 06/07/2019 22:20

Instrument ID 10MSHR12 (Y)
GC Column ID 629920
ICAL ID Y190424

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
Labeled Compounds					
1,2,3,4-TCDD-13C	M/M+2	0.77	0.65 - 0.89	----	----
2,3,7,8-TCDD-13C	M/M+2	0.77	0.65 - 0.89	101.6	82 - 121
1,2,3,7,8-PeCDD-13C	M+2/M+4	1.56	1.32 - 1.78	98.3	62 - 160
1,2,3,4,7,8-HxCDD-13C	M+2/M+4	1.25	1.05 - 1.43	97.8	85 - 117
1,2,3,6,7,8-HxCDD-13C	M+2/M+4	1.22	1.05 - 1.43	93.9	85 - 118
1,2,3,7,8,9-HxCDD-13C	M+2/M+4	1.22	1.05 - 1.43	----	----
1,2,3,4,6,7,8-HpCDD-13C	M+2/M+4	1.06	0.88 - 1.20	113.4	72 - 138
OCDD-13C	M+2/M+4	0.89	0.76 - 1.02	214.2	96 - 415
2,3,7,8-TCDF-13C	M/M+2	0.76	0.65 - 0.89	94.0	71 - 140
1,2,3,7,8-PeCDF-13C	M+2/M+4	1.54	1.32 - 1.78	89.9	76 - 130
2,3,4,7,8-PeCDF-13C	M+2/M+4	1.52	1.32 - 1.78	95.1	77 - 130
1,2,3,4,7,8-HxCDF-13C	M/M+2	0.51	0.43 - 0.59	100.9	76 - 131
1,2,3,6,7,8-HxCDF-13C	M/M+2	0.52	0.43 - 0.59	95.3	70 - 143
2,3,4,6,7,8-HxCDF-13C	M/M+2	0.52	0.43 - 0.59	92.9	73 - 137
1,2,3,7,8,9-HxCDF-13C	M/M+2	0.52	0.43 - 0.59	88.9	74 - 135
1,2,3,4,6,7,8-HpCDF-13C	M/M+2	0.45	0.37 - 0.51	105.9	78 - 129
1,2,3,4,7,8,9-HpCDF-13C	M/M+2	0.45	0.37 - 0.51	104.1	77 - 129
Cleanup Standard					
2,3,7,8-TCDD-37Cl4	M+2/M+4	(4)		9.5	7.9 - 12.7

1. See Table 8, Method 1613, for m/z specifications.
2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.
3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).
4. No ion abundance ratio; report concentration found.

REPORT OF LABORATORY ANALYSIS

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**Method 1613B Analysis Results
PCDD/PCDF Calibration Verification
Native Analytes**

Lab Name CS3/CPM-11321-155
Filename Y190607B_02
Injected By BAL
Analyzed 06/07/2019 22:20

Instrument ID 10MSHR12 (Y)
GC Column ID 629920
ICAL ID Y190424

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
2,3,7,8-TCDD	M/M+2	0.78	0.65 - 0.89	11.1	7.8 - 12.9
1,2,3,7,8-PeCDD	M+2/M+4	0.60	0.52 - 0.70	48.4	39 - 65
1,2,3,4,7,8-HxCDD	M+2/M+4	1.21	1.05 - 1.43	49.3	39 - 64
1,2,3,6,7,8-HxCDD	M+2/M+4	1.25	1.05 - 1.43	47.3	39 - 64
1,2,3,7,8,9-HxCDD	M+2/M+4	1.24	1.05 - 1.43	47.9	41 - 61
1,2,3,4,6,7,8-HpCDD	M+2/M+4	1.07	0.88 - 1.20	48.0	43 - 58
OCDD	M+2/M+4	0.86	0.76 - 1.02	94.7	79 - 126
2,3,7,8-TCDF	M/M+2	0.81	0.65 - 0.89	9.7	8.4 - 12.0
1,2,3,7,8-PeCDF	M+2/M+4	1.54	1.32 - 1.78	49.5	41 - 60
2,3,4,7,8-PeCDF	M+2/M+4	1.57	1.32 - 1.78	48.1	41 - 61
1,2,3,4,7,8-HxCDF	M+2/M+4	1.28	1.05 - 1.43	48.1	45 - 56
1,2,3,6,7,8-HxCDF	M+2/M+4	1.27	1.05 - 1.43	50.5	44 - 57
2,3,4,6,7,8-HxCDF	M+2/M+4	1.26	1.05 - 1.43	49.4	44 - 57
1,2,3,7,8,9-HxCDF	M+2/M+4	1.25	1.05 - 1.43	48.1	45 - 56
1,2,3,4,6,7,8-HpCDF	M+2/M+4	1.02	0.88 - 1.20	48.3	45 - 55
1,2,3,4,7,8,9-HpCDF	M+2/M+4	1.04	0.88 - 1.20	49.4	43 - 58
OCDF	M+2/M+4	0.87	0.76 - 1.02	87.9	63 - 159

1. See Table 8, Method 1613, for m/z specifications.
2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.
3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).

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